

NATIONAL SERVICE MANUAL

1930 CAR MODELS

1930 CAR MODELS—EQUIPMENT USED

Page	CAR	Model	Serial No.	Year	Make	Type	Gr. Ter.	BATTERY		Switch Make	LIGHTING				Edison Mazda Lamp Numbers			
											Circuit	Fuses	Breaker	Head	Aux.	Side	Dsh.-tail	Stop
1528	AUBURN	6-85		1930	U.S.L.	XY-13X-6A	Pos.	Sor. Man.		20	*	1129	*	63	63	87	63	
1530	AUBURN	8-95		1930	U.S.L.	XY-13X-6A	Pos.	Sor. Man.		20	*	1129	*	63	63	87	63	
1532	AUBURN	8-125		1930	U.S.L.	XY-15X-6A	Pos.	Sor. Man.		20	*	1129	*	63	63	87	63	
*334	BLACKHAWK	L-6		1930	P-O-L	615-J	Neg.	Delco-Remy	486-G	*	D.R.410-C	1133	*	63	63	87	*	
*336	BLACKHAWK	L-8		1930	P-O-L	615-J	Neg.	Delco-Remy	486-G	*	D.R.410-C	1133	*	63	63	87	*	
1534	BUICK	40		1930	Exide	3-MXV-13-1	Neg.	Delco-Remy	484-F	*	D.R.410-A	1110	*	63	63	87	81	
1536	BUICK	50, 60		1930	Exide	3-MXV-15-1	Neg.	Delco-Remy	484-F	*	D.R.410-A	1110	*	63	63	87	81	
1538	CADILLAC	353	500,001 Up	1930	Exide	3-LXV-15-2G	Pos.	Delco-Remy	486-H	*	D.R.5759	1110	*	63	63	87	63	
1540	CADILLAC	452	(V-16)	1930	Exide	3-XCRV-21-2G	Pos.	Delco-Remy	486-D	*	D.R.5759	1110	*	63	63	87	63	
1542	CHEVROLET	Universal AD-1001 Up	1930	Various		Neg.	Delco-Remy	478-C	15	*	1110	63	63	87	63			
1544	CHRYSLER	Six CJ		1930	Willard	WSB-13	Pos.	Clum	8821	20	*	1110	*	63	63-1158.	1158	87	
1546	CHRYSLER	66 'CC'		1930	Willard	WSB-15	Pos.	Clum	8821	20	*	1110	*	63	63-1158.	1158	87	
1548	CHRYSLER	70 'V'		1930	Willard	WSB-17	Pos.	Clum	8821	20	*	1110	*	63	63-1158.	1158	87	
1550	CHRYSLER	77 'W'		1930	Willard	WSB-17	Pos.	Clum	8821	*	D.R.410-E	1110	*	63	63-1158.	1158	87	
*462	CHRYSLER	30 Imperial		1930	Willard	SJWR-6	Pos.	Clum	8821	*	D.R.410-E	1110	*	64	64-63	87	87	
1552	CORD	L-29		1930	U.S.L.	XY-15X-6A	Pos.	Sor. Man.	5650-A	*	D.R.	1110	*	63	63-87	87	63	
*518	DE SOTO	K Six		1930	Willard	WSB-13	Pos.	Sor. Man.	5500-A	20	*	1110	63	63-1158.	1158	87		
1554	DE SOTO	CF Eight L001WP Up	1930	Willard	WSB-13	Pos.	Clum	8821	20	*	1110	63	63-1158.	1158	87			
1556	DODGE	DD Six 0001WP Up	1930	Willard	WSB-15	Pos.	Clum	8821	20	*	1110	63	63-1158.	1158	87			
*540	DODGE	Six		1930	Willard	CWR-15	Pos.	Clum	8821	20	*	1110	63	63-1158.	1158	87		
*542	DODGE	Senior Six		1930	Willard	CWR-17	Pos.	B & S	40315	*	*	1110	*	63	63	87	81	
1558	DODGE	DC Eight E001WP Up	1930	Willard	WSB-15	Pos.	Clum	8821	20	*	1110	*	63	63-1158.	1158	87		
1560	DUESENBERG	J		1929-30	Exide	3-XCRV-21-2G	Neg.	Delco-Remy	486-D	*	D.R.5759	1110	*	63	63-1129	63		
*580	DURANT	6-63		1929-30	U.S.L.	3-CVX-5X-6	Neg.	Clum	10725	20	*	1110	*	63	63	87	63	
1562	DURANT	6-14		1930	U.S.L.	3-CVX-6X-6A	Neg.	Clum	5192	20	*	1110	63	63-1158.	1158	87		
1564	DURANT	6-17		1930	U.S.L.	3-HVX-6X-6A	Neg.	Clum	5192	20	*	1110	63	*	63-1158.	1158	87	
1566	ELCAR	6-75		1930	U.S.L.	XY-13X-6	Neg.	Aid 'FingerTipCont.'		*	*	1110	*	63	63	87	63	
1568	ELCAR	8-95, 96		1930	U.S.L.	3-HVX-6X-6A	Neg.	Delco-Remy	1303	*	*	1110	*	63	63	87	63	
1570	ELCAR	8-130, 140		1930	U.S.L.	3-HVX-6X-6A	Neg.	Aid 'FingerTipCont.'		*	*	1110	*	63	63	87	63	
1572	ERSKINE	53		1930	Willard	WJ-1-11	Pos.	Delco-Remy	486-E	*	D.R.410-F	1110	63	*	63	87	81	
1574	ESSEX	Chal. 1,165,674 Up	1930	Exide	3-XI-13-1G	Neg.	Sor. Man.		20	*	1110	*	63	63	87	81		
1576	FORD	A (New)		1930	Ford		Pos.	Ford	A-11654-B	*	*	1110	63	63	63	1129	*	
1578	FRANKLIN	145,147. 198,000 Up	1930	Various		Pos.	Delco-Remy	486-J	20	*	1110	63	*	63	1129	63		
1580	GARDNER	136. SST-827 Up	1930	P-O-L	615-JFK	Pos.	Delco-Remy	420-Q	10	*	1110	63	63	63	87	64		
1582	GARDNER	140.		1930	P-O-L	615-JFK	Pos.	Delco-Remy	420-Q	10	*	1110	63	63	63	87	64	
1584	GARDNER	150. SSL-367 Up	1930	P-O-L	617-RHK	Pos.	Delco-Remy	420-Q	10	*	1110	63	63	63	87	64		
1586	GRAHAM	Std. 6 900,001 Up	1930	Willard	WSB-13	Pos.	B & S	50239	20	*	1110	63	63	63-1158.	1158	81		
1588	GRAHAM	Spec. 6 736,001 Up	1930	Willard	WSB-15	Pos.	B & S	50239	20	*	1110	*	63	63	87	81		
1590	GRAHAM	Std. 8 615,001 Up	1930	Willard	WSB-15	Pos.	B & S	50239	20	*	1110	*	63	63	87	81		
1592	GRAHAM	Cust. 8		1930	Willard	WSB-17	Pos.	B & S	50239	20	*	1110	*	63	63	87	81	
1594	HUDSON	Great 8... 893, 402 Up	1930	Exide	3-XI-13-1G	Neg.	Sor. Man.		20	*	1110	*	63	63	87	81		
1596	HUPMOBILE	S. S-5001 Up	1930	Willard	WSB-13	Pos.	Clum		20	*	1110	63	*	63	87	63		
1598	HUPMOBILE	C. C-5001 Up	1930	Willard	SJRR-4	Pos.	Clum	9022	15	*	1110	63	*	63	87	63		

Page numbers indicated by (*) refer to Second Edition National Service Manual. In First Edition these car models will be found in 1929 Section.

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Make	IGNITION			STARTER			GENERATOR			Relay			CAR	Page	
	Coil Model	Dist. Model	Switch Make	Model	Make	Model	Make	Model	Regulator	Year	Model				
Delco-Remy	528-C	641-F	Electrolock	5-A	Delco-Remy	716-C	Delco-Remy	955-H	265-B	1930	6-85	AUBURN		1528	
Delco-Remy	528-C	657-M	Electrolock	5-A	Delco-Remy	716-C	Delco-Remy	955-H	265-B	1930	8-95	AUBURN		1530	
Delco-Remy	528-C	657-N	Electrolock	5-A	Delco-Remy	718-A	Delco-Remy	955-J	265-B	1930	8-125	AUBURN		1532	
Delco-Remy	527-A	4033	Delo-Remy	426-J	Delco-Remy	726-C	Delco-Remy	949-H	265-B	1930	L-6	BLACKHAWK		334*	
Delco-Remy	528-C	658-U	Delo-Remy	426-J	Delco-Remy	724-J	Delco-Remy	944-N	265-B	1930	L-8	BLACKHAWK		336*	
Delco-Remy	528-H	640-Y	Oakes	Hershey	Delco-Remy	725-D	Delco-Remy	940-M	265-B	1930	40	BUICK		1534	
Delco-Remy	528-H	650-B	Oakes	Hershey	Delco-Remy	725-D	Delco-Remy	940-M	265-B	1930	50, 60	BUICK		1536	
Delco-Remy	530-B	4055	Delco-Remy	426-M	Delco-Remy	728-D	Delco-Remy	927-D	266-N	1930	353	CADILLAC		1538	
Delco-Remy	530-G	4057	Delco-Remy	426-M	Delco-Remy	728-D	Delco-Remy	927-E	266-N	1930	452	CADILLAC		1540	
Delco-Remy	528-C	633-G	Delco-Remy	427-B	Delco-Remy	714-L	Delco-Remy	943-J	265-H	1930	Universal	CHEVROLET		1542	
North East	21998	10843	Coil Lock Switch	Delco-Remy	714-Q	Delco-Remy	943-L	265-B		1930	Six	CHRYSLER		1544	
Delco-Remy	526-Z	639-X	Coil Lock Switch	Delco-Remy	714-P	Delco-Remy	943-H	265-B		1930	66	CHRYSLER		1546	
Delco-Remy	526-T	650-G	Coil Lock Switch	Delco-Remy	728-B	Delco-Remy	957-G	265-B		1930	70	CHRYSLER		1548	
Delco-Remy	528-E	659-E	Electrolock	9-B	Delco-Remy	728-B	Delco-Remy	959-D	265-B		1930	77	CHRYSLER		1550
Delco-Remy	528-E	659-E	Electrolock	5-B	Delco-Remy	728-B	Delco-Remy	949-Q	265-B		1930	80	CHRYSLER		462*
Delco-Remy	526-V	658-W	Coil Lock Switch	Delco-Remy	724-N	Delco-Remy	957-J	265-F		1930	L-29	CORD		1552	
North East	21998	10849	Coil Lock Switch	North East	SBH6534	North East	LAB6530	20220		1930	K-1	DE SOTO		518*	
Delco-Remy	526-N	660-D	Coil Lock Switch	Delco-Remy	714-Q	Delco-Remy	943-L	265-G		1930	CF	DE SOTO		1554	
Delco-Remy	526-L	632-D	Coil Lock Switch	Delco-Remy	714-Q	Delco-Remy	943-L	265-G		1930	DD	DODGE		1556	
North East	21904	10845	Coil Lock Switch	North East	6494	North East	6530	20220		1930	Six	DODGE		540*	
North East	19232	10846-A	Coil Lock Switch	North East	6400	North East	6390-A	20220		1930	Senior Six	DODGE		542*	
Delco-Remy	526-N	660-B	Coil Lock Switch	Delco-Remy	714-Q	Delco-Remy	943-L	265-G		1930	DC	DODGE		1558	
Delco-Remy	553-A,B	4044	Coil Lock Switch	Delco-Remy	429	Delco-Remy	428	265-B	1929-30	J	DUESENBERG		1560		
Auto-Lite	IG-4066	IGB-4000-B	Shaler Lock	Auto-Lite	MZ-4001	Auto-Lite	GAL-4104	CB-4014		1930	6-63	DURANT		580*	
Auto-Lite	IG-4082	IGB-4031	Coil Lock Switch	Auto-Lite	MAJ-4001	Auto-Lite	GAL-4130	CB-4014		1930	6-14	DURANT		1562	
Auto-Lite	IG-4082	IGB-4036-A	Coil Lock Switch	Auto-Lite	MAD-4101	Auto-Lite	GAK-4103	CB-4007		1930	6-17	DURANT		1564	
Delco-Remy	528-C	631-E	Shaler Lock	Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	6-75	ELCAR		1566	
Delco-Remy	528-C	651-C	Shaler Lock	Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	8-95, 96	ELCAR		1568	
Delco-Remy	553-H	668-H	Coil Lock Switch	Delco-Remy	725-G	Delco-Remy	945-U	265-B		1930	130, 140	ELCAR		1570	
Delco-Remy	526-Q	639-J	Coil Lock Switch	Delco-Remy	718-L	Delco-Remy	955-U	265-B		1930	53	ERSKINE		1572	
Auto-Lite	CE-4012	IGB-4030	Electrolock	9-B	Auto-Lite	MZ-4017	Auto-Lite	GAM-4102	CB-4016		1930	Chall	ESSEX		1574
Ford		Electrolock	6-A	Ford		Ford		Ford		1930	New A	FORD		1576	
Delco-Remy	528-X	642-B	Coil Lock Switch	Delco-Remy	723-C	Delco-Remy	957-E	265-B		1930	145, 147	FRANKLIN		1578	
Delco-Remy	526-W	640-L	Coil Lock Switch	Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	136	GARDNER		1580	
Delco-Remy	526-W	658-B	Coil Lock Switch	Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	140	GARDNER		1582	
Delco-Remy	526-W	658-R	Coil Lock Switch	Delco-Remy	720-Y	Delco-Remy	955-K	265-B		1930	150	GARDNER		1584	
Delco-Remy	528-C	639-K	Oakes	Hershey	Delco-Remy	713-K	Delco-Remy	955-Q	265-B		1930	Std. 6	GRAHAM		1586
Delco-Remy	528-C	640-W	Oakes	Hershey	Delco-Remy	718-E	Delco-Remy	957-B	265-B		1930	Spec. 6	GRAHAM		1588
Delco-Remy	528-C	660-C	Oakes	Hershey	Delco-Remy	725-K	Delco-Remy	957-B	265-B		1930	Std. 8	GRAHAM		1590
Delco-Remy	528-C	668-D	Oakes	Hershey	Delco-Remy	725-G	Delco-Remy	957-C	265-B		1930	Cust. 8	GRAHAM		1592
Auto-Lite	CE-4012	IGH-4009	Electrolock	9-B	Auto-Lite	MAD-4101, 8	Auto-Lite	GAM-4102	CB-4016		1930	Great 8	HUDSON		1594
Auto-Lite	IG-4080	IGC-4028	Electrolock	9-B	Auto-Lite	MAC-4221	Auto-Lite	GAL-4124	CB-4014		1930	S	HUPMOBILE		1596
Auto-Lite	CE-4001	IGH-4008-C	Electrolock	5-A	Auto-Lite	MAB-4021	Auto-Lite	GAG-4118	CB-4012		1930	C	HUPMOBILE		1598

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Page	CAR	Model	Serial No.	Year	Make	Type	Gr. Ter.	Switch Make	LIGHTING						Edison Lamp Numbers		
									Circuit	Fuses	Breaker	Head	Aux.	Side	Dsh.-tail		
1600	HUPMOBILE	H & U	H-5001 Up	1930	Willard	SJRR-5	Pos.	Sor Man.	15.....	*	1110.....	63.....	*	63.....	87.....	63	
*850	JORDAN	6-E		1930	Willard	WSB-15	Neg.	Sor Man.		*	Kellogg	1110.....	*	63.....	63.....	87.....*	
1602	JORDAN	70		1930	Willard	WSB-15	Neg.	Sor Man.		*	Kellogg	1110.....	63.....	*	63-1158..	1158.....*	
*852	JORDAN	80, 90		1930	Willard	WSB-15	Neg.	Sor Man.		*	Kellogg	1110.....	*	63.....	63.....	87.....*	
1604	JORDAN	Speedway		1930	Willard	RJ-15	Neg.	Sor Man.		*	Kellogg	1110.....	63.....	*	63.....	87.....63	
1606	KISSEL	6-73		1930	Willard	CWR-13	Pos.	Clum	10677....	10.....	*	1133.....	*	63.....	64-63.....	63.....64	
1608	KISSEL	8-95		1930	Willard	SJWR-4	Pos.	Clum	10677....	10.....	*	1133.....	*	63.....	64-63.....	63.....64	
1610	KISSEL	8-126		1930	Willard	SJWR-4	Pos.	Clum	10677....	10.....	*	1133.....	*	81.....	82-81.....	81.....64	
1612	LA SALLE	340	600,001 Up	1930	Exide	3-LXV-15-2G	Pos.	Delco-Remy	.486-H.....	*	D.R.5759....	1110.....	*	63.....	63.....	87.....63	
1614	MARMON	Roosevelt		1930	National	H3-15X	Pos.	Aid	312.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....64	
1616	MARMON	8-69	Q-130-1 Up	1930	National	H3-15X	Pos.	Aid	312.....	*	D.R.410-C ..	1110.....	63.....	*	63.....	87.....64	
1618	MARMON	8-79	W-100-1 Up	1930	National	B3-17X	Pos.	Aid	312.....	*	D.R.410-C ..	1110.....	63.....	*	63.....	87.....64	
1620	MARMON	Big 8	H-110-1 Up	1930	National	B3-17X	Pos.	Aid	312.....	*	D.R.410-C ..	1110.....	63.....	*	63.....	87.....64	
*954	MARQUETTE	30		1930	Exide	3-VXA-13-1	Neg.	Delco-Remy	.486-B.....	*	D.R.410-A ..	1110.....	*	63.....	63.....	87.....81	
1622	NASH	450	Single 6	1930	U.S.L.	3-HVX-5X-6A	Neg.	Delco-Remy	.486-C.....	20.....	*	1110.....	*	63.....	63.....	87.....63	
1624	NASH	480	Twin Ig. 6	1930	U.S.L.	3-HVX-5X-6A	Pos.	Delco-Remy	.486-C.....	20.....	*	1110.....	*	63.....	63.....	87.....63	
1626	NASH	490	Twin Ig. 8	1930	U.S.L.	3-HVX-7X-6A	Pos.	Delco-Remy	.486-C.....	20.....	*	1110.....	*	63.....	63.....	87.....81	
1628	OAKLAND	0/8	273,500-08 Up	1930	Delco, Willard		Neg.	Clum	9067....	20.....	*	1110.....	*	63.....	63.....	87.....81	
1630	OLDSMOBILE	F-30		1930	Willard	WCB-13	Neg.	Delco-Remy	.486-B.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....63	
1632	PEERLESS	A Std. 8		1930	Willard	WSB-15	Pos.	Aid		20.....	*	1110.....	63.....	*	63.....	87.....63	
1634	PEERLESS	B & C Master&Cust. 8	1930		Willard	WSB-19	Pos.	Aid		20.....	*	1110.....	63.....	*	63.....	87.....63	
1636	PIERCE ARROW	A & B		1930	Willard	SJWR-5	Pos.	Delco-Remy	.486-D.....	*	D.R.410-C ..	1110.....	81.....	*	63-81 ..	1129.....87	
1638	PIERCE ARROW	C		1930	Willard	SJWR-5	Pos.	Delco-Remy	.486-D.....	*	D.R.410-C ..	1110.....	81.....	*	63-81 ..	1129.....87	
1640	PLYMOUTH	55 'U'		1929-30	Willard	WSB-13	Pos.	Clum	8821....	20.....	*	1110.....	*	63.....	63-1158 ..	1158.....87	
1642	PONTIAC	P/6	591,501-P Up	1930	Delco, Willard		Neg.	Clum	9067....	20.....	*	1110.....	*	63.....	63.....	87.....63	
1644	REO	15		1930	Willard	RSB-13	Neg.	Delco-Remy	.482-F.....	20.....	*	1110.....	*	63.....	63.....	87.....64	
1646	REO	20, 25		1930	Willard	SJRR-4	Neg.	Delco-Remy	.482-F.....	20.....	*	1110.....	*	63.....	63.....	87.....63	
1648	STUDEBAKER	GL Dict. 6		1930	Willard	WJ-1-11	Pos.	Delco-Remy	.486-E.....	*	D.R.410-C ..	1110.....	63.....	*	63.....	87.....81	
1650	STUDEBAKER	FC Dict. 8		1930	Willard	WJ-1-11	Pos.	Delco-Remy	.486-E.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....81	
1652	STUDEBAKER	GJ Comm. 6		1930	Willard	SJWR-3	Pos.	Delco-Remy	.486-E.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....81	
1654	STUDEBAKER	FD Comm. 8		1930	Willard	SJWR-3	Pos.	Delco-Remy	.486-E.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....81	
1656	STUDEBAKER	FE, FH Pres. 8		1930	Willard	SJWR-4	Pos.	Delco-Remy	.486-E.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....81	
*1436	STUTZ	M		1930	P-O-L	A-617-SH	Neg.	Delco-Remy	.486-G.....	*	D.R.410-C ..	1110.....	*	63.....	63.....	87.....63	
1658	VIKING	V-30		1930	Willard	WSB-15	Neg.	Delco-Remy	.486-B.....	*	D.R.410-C ..	1110.....	63.....	*	63.....	87.....63	
1660	WHIPPET	96-A		1930	U.S.L.	3-CVX-5X-6A	Neg.	B & S	50160....	20.....	*	1110.....	*	*	63-1158 ..	1158.....63	
1662	WILLYS SIX	98-B		1930	U.S.L.	3-CVX-6X-6A	Neg.	B & S	50160....	20.....	*	1110.....	63.....	*	63-1158 ..	1158.....63	
1664	WILLYS KNIGHT	70-B		1930	U.S.L.	3-HVX-6X-6A	Neg.	B & S	50160....	20.....	*	1110.....	*	63.....	63-1158 ..	1158.....63	
1666	WILLYS KNIGHT	66-B		1929-30	U.S.L.	3-HVX-8X-4A	Neg.	B & S	50160....	20.....	*	1110.....	63.....	*	63.....	87.....63	
1668	WILLYS KNIGHT	66-B		1930	U.S.L.	3-HVX-8X-4A	Neg.	B & S	50160....	20.....	*	1110.....	63.....	*	63.....	87.....63	
*1518	WINDSOR	6-69		1930	U.S.L.	XY-13X	Neg.	Delco-Remy	1303....	*	D.R.....	1110.....	*	63.....	63.....	*	63
*1520	WINDSOR	6-77		1930	U.S.L.	XY-15X-6	Neg.	Delco-Remy	1309....	*	*	1110.....	*	81.....	63.....	87.....81	
*1522	WINDSOR	8-82, 92		1930	U.S.L.	3-HVX-7X	Neg.	Delco-Remy	1309....	*	*	1110.....	*	81.....	63.....	87.....81	

Page numbers indicated by (*) refer to Second Edition National Service Manual. In First Edition these car models will be found in 1929 Section.

1930 CAR MODELS—EQUIPMENT USED

Make	Coil Model	IGNITION Dist. Model	Switch Model	STARTER		GENERATOR		Relay Regulator	Year	Model	CAR	Page	
				Make	Model	Make	Model						
Auto-Lite	CE-4001	IGH-4008-C	Electrolock	5-A	Auto-Lite	MR-4102	Auto-Lite	GAG-4118	CB-4012	1930	H & U	HUPMOBILE	1600
Auto-Lite	IG-4066	IGB-4006	Oakes	Hershey	Auto-Lite	MAB-4104	Auto-Lite	GAG-4114	CB-4012	1930	E-6	JORDAN	850*
Auto-Lite	IG-4078	IGH-4005-A	Oakes	Hershey	Auto-Lite	MUA-4007	Auto-Lite	GAL-4126	CB-4014	1930	70	JORDAN	1602
Auto-Lite	IG-4078	IGJ-4001-A	Oakes	Hershey	Auto-Lite	MUA-4007	Auto-Lite	GAG-4109	CB-4012	1930	80, 90	JORDAN	852*
Auto-Lite	IG-4065	IGJ-EO-1164	Oakes	Hershey	Auto-Lite	ML-4146	Auto-Lite	GAG-4108	CB-4012	1930	Speedway	JORDAN	1604
Delco-Remy	528-C	640-L		Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	6-73	KISSEL	1606
Delco-Remy	528-C	658-L		Delco-Remy	716-A	Delco-Remy	955-H	265-B		1930	8-95	KISSEL	1608
Delco-Remy	528-C	668-B		Delco-Remy	720-Q	Delco-Remy	941-W	265-B		1930	8-126	KISSEL	1610
Delco-Remy	530-B	4055	Delco-Remy	426-M	Delco-Remy	728-D	Delco-Remy	927-D	266-N	1930	340	LA SALLE	1612
Delco-Remy	528-T	658-C	Coil Lock Switch	Delco-Remy	714-C	Delco-Remy	949-X	265-B		1930	Roosevelt	MARMON	1614
Delco-Remy	526-P	658-C	Coil Lock Switch	Delco-Remy	714-C	Delco-Remy	949-X	265-B		1930	8-69	MARMON	1616
Delco-Remy	526-P	652-D	Coil Lock Switch	Delco-Remy	718-M	Delco-Remy	949-F	265-B		1930	8-79	MARMON	1618
Delco-Remy	526-P	652-D	Coil Lock Switch	Delco-Remy	718-M	Delco-Remy	949-F	265-B		1930	Big 8	MARMON	1620
Delco-Remy	528-Q	639-Y	Coil Lock Switch	Delco-Remy	714-N	Delco-Remy	943-K	265-G		1930	30	MARQUETTE	954*
Auto-Lite	IG-4065	IGB-4015	Delco-Remy		Auto-Lite	MAB-4026	Auto-Lite	GAL-4129	CB-4014	1930	Single 6	NASH	1622
Auto-Lite	IG-4065	IGE-4005	Delco-Remy		Auto-Lite	MAD-4107,9	Auto-Lite	GAR-4109	CB-4014	1930	Twin Ig. 6	NASH	1624
Auto-Lite	CE-4011	IGK-4002	Delco-Remy		Auto-Lite	MAB-4024	Auto-Lite	GAR-4110	CB-4014	1930	Twin Ig. 8	NASH	1626
Delco-Remy	526-R	660-A	Coil Lock Switch	Delco-Remy	726-H	Delco-Remy	959-J	265-C		1930	0/8	OAKLAND	1628
Delco-Remy	528-P	639-G	Coil Lock Switch	Delco-Remy	714-H	Delco-Remy	949-W	265-B		1930	F-30	OLDSMOBILE	1630
Auto-Lite	CE-4013	IGH-4011-A	Coil Lock Switch	Auto-Lite	MAB-4029	Auto-Lite	GAL-4126	CB-4014	1930	A	PEERLESS	1632	
Auto-Lite	CE-4013	IGH-4010	Coil Lock Switch	Auto-Lite	ML-4146	Auto-Lite	GAR-4011	CB-4014	1930	B & C	PEERLESS	1634	
Delco-Remy	528-E	668-E	Oakes	Hershey	Delco-Remy	728-C	Delco-Remy	927-F	265-B	1930	A & B	PIERCE ARROW	1636
Delco-Remy	528-E	652-E	Oakes	Hershey	Delco-Remy	728-C	Delco-Remy	959-F	265-B	1930	C	PIERCE ARROW	1638
Delco-Remy	526-S,Z	635-T,W	Coil Lock Switch	Delco-Remy	714-J,Q	Delco-Remy	947-B	265-B		1930	55	PLYMOUTH	1640
Delco-Remy	526-R	639-U	Coil Lock Switch	Delco-Remy	714-R	Delco-Remy	943-JX	265-H		1930	P/6	PONTIAC	1642
Delco-Remy	528-E	641-D	Electrolock	5-B	Delco-Remy	726-E	Delco-Remy	955-L	265-B	1930	15	REO	1644
Delco-Remy	528-E	640-S	Delco-Remy		Delco-Remy	724-V	Delco-Remy	955-G	265-B	1930	20, 25	REO	1646
Delco-Remy	528-E	639-J	Oakes	Hershey	Delco-Remy	726-F	Delco-Remy	955-U,949-J	265-B	1930	Dict. 6	STUDEBAKER	1648
Delco-Remy	528-E	658-Z	Oakes	Hershey	Delco-Remy	726-G	Delco-Remy	955-S,C	265-B	1930	Dict. 8	STUDEBAKER	1650
Delco-Remy	528-E	636-Y	Oakes	Hershey	Delco-Remy	726-F	Delco-Remy	949-J	265-B	1930	Comm. 6	STUDEBAKER	1652
Delco-Remy	528-E	658-V	Oakes	Hershey	Delco-Remy	726-G	Delco-Remy	955-C	265-B	1930	Comm. 8	STUDEBAKER	1654
Delco-Remy	528-E	668-C	Oakes	Hershey	Delco-Remy	728-C	Delco-Remy	955-C	265-B	1930	Pres. 8	STUDEBAKER	1656
Delco-Remy	527-A	4028	Delco-Remy	426-C	Delco-Remy	726-C	Delco-Remy	391	265-B	1930	M	STUTZ	1436*
Delco-Remy	528-P	658-T	Coil Lock Switch	Delco-Remy	725-H	Delco-Remy	955-R	265-G		1930	V-30	VIKING	1658
Auto-Lite	IG-4065	IGB-4020-A	Electrolock	9-A	Auto-Lite	MZ-4001	Auto-Lite	GAL-4116	CB-4014	1930	96-A	WHIPPET	1660
Auto-Lite	IG-4083	IGB-4032	Coil Lock Switch	Auto-Lite	MAJ-4002	Auto-Lite	GAL-4131	CB-4014	1930	98-B	WILLYS SIX	1662	
Auto-Lite	IG-4065	IGC-4004	Electrolock	9-B	Auto-Lite	MAB-4014	Auto-Lite	GAL-4103	CB-4014	1930	70-B	WILLYS KNIGHT	1664
North East	22636	10877	Electrolock	5-B	North East	6585	North East	6580	20220	1929-30	66-B	WILLYS KNIGHT	1666
Auto-Lite	IG-4065	IGC-4029	Electrolock	5-B	Auto-Lite	MAB-4018	Auto-Lite	GAB-4009	CB-4014	1930	66-B	WILLYS KNIGHT	1668
Auto-Lite	IG-4066	IGB-4006	Delco-Remy	1302	Auto-Lite	MAD-4104	Auto-Lite	GAL-4104	CB-4012	1930	6-69	WINDSOR	1518*
Delco-Remy	526-W	640-F	Coil Lock Switch	Delco-Remy	714-G	Delco-Remy	949-V	265-B		1930	6-77	WINDSOR	1520*
Delco-Remy	526-W	658-H	Coil Lock Switch	Delco-Remy	724-J	Delco-Remy	940-N	265-B		1930	8-82, 92	WINDSOR	1522*

MISURA

(CASA DEL LAVORO)

PIRELLA PIRELLI, DIRETTORE E PROPRIETARIO
MILANO 1930.

PIRELLI

1930 CAR MODELS

CAR PAGES

AUBURN
MODEL 6-85 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-13X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front seat on right side.

IGNITION:—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

Distributor Model 641-F. Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Maximum automatic advance is 22 degrees. Ignition switch is an Electrolock. Electrolock must be removed as a unit with the distributor.

Mounting:—Distributor is mounted on the cylinder head and must be removed from the right side. To remove distributor, remove Electrolock from dash, disconnect manual advance rod and remove head with cable intact. Then loosen set screw in side of shaft housing and pry up on distributor until it can be lifted from place.

Oiling:—Fill the grease cup with medium grease and turn down one turn every month or each 1000 miles. Put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees (on the flywheel) past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches a position 6 degrees past top dead center when the flywheel mark '1-6DC' will be three teeth past the indicator on the flywheel housing. Loosen the advance arm clamp screw and rotate the distributor until contacts begin to separate. Tighten the clamp screw and connect the spark plug in cylinder No. 1 to the terminal directly opposite the rotor. Connect the remaining spark plugs in order 5-3-6-2-4 counterclockwise around the distributor head.

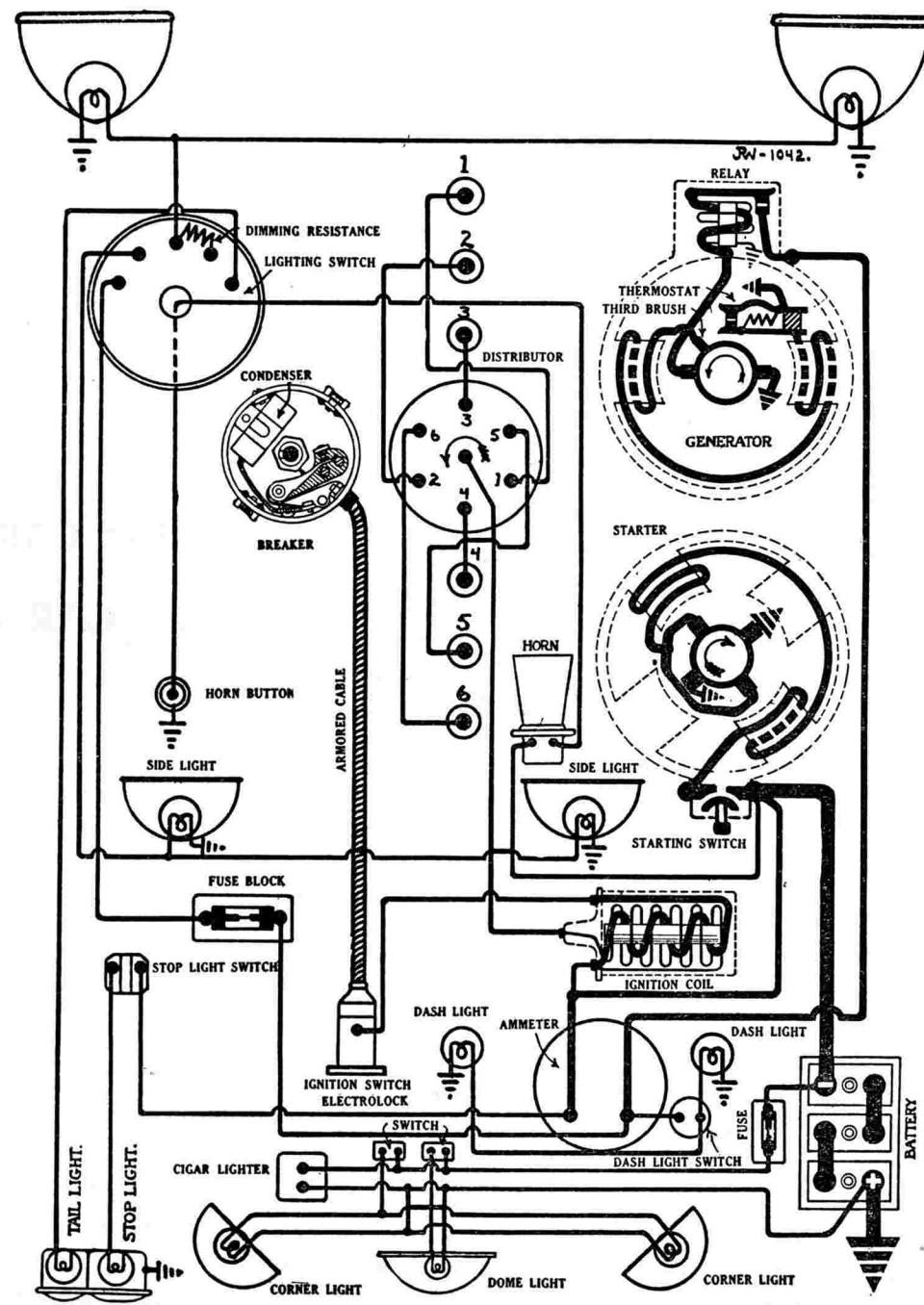
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{17}{32}$ inches. Stem diameter, .3425-.341 inch. Stem length, $5\frac{1}{4}$ inches. Valve lift, $11\frac{1}{32}$ inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{13}{32}$ inches. Stem diameter, .3425-.341 inch. Stem length, $5\frac{1}{4}$ inches. Valve lift, $11\frac{1}{32}$ inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked '1-6DC' for inlet opening. Valve stem guides are removable. Oversize valves are made.

STARTER:—Model 716-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise (armature shaft), viewed from



AUBURN
MODEL 6-85 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 90 R.P.M. drawing 150 amperes at 6 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175° F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) reached at 1650 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Then remove two bolts in the bracket under the generator and lift generator from place. The water pump can be removed by taking out the cap screws on the generator bosses.

Belt Adjustment:—To adjust belt tension, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not make the drive belt too tight or it will crowd the generator bearings.

Oiling:—Put 4 or 5 drops of light engine oil in each generator oiler every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Soreng-Manegold Switch. Lighting switch is mounted at lower end of steering column. Dimming is through a resistance mounted on the switch. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail, dome and corner lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FUSE:—Lighting fuse on block on dash is 20 ampere capacity.

AUBURN
MODEL 8-95 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-13X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 90 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under front seat on right side.

IGNITION:—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

Distributor Model 657-M. Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees (equal to 90 degrees of crank-shaft rotation). Contacts must be synchronized to secure this result for correct engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 15 degrees. The ignition switch is an Electrolock.

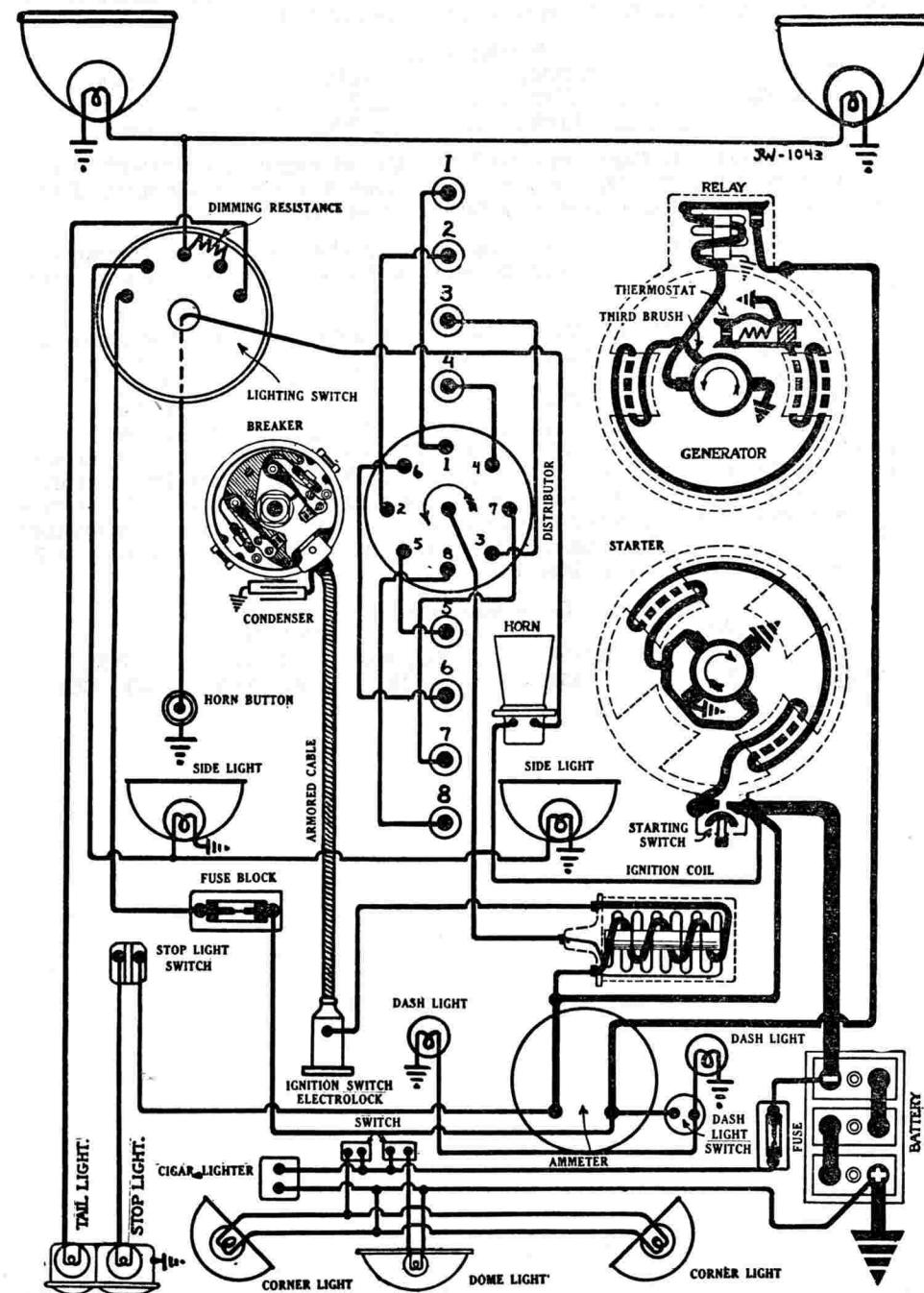
Mounting:—Distributor is mounted on the cylinder head. The Electrolock must be removed as a unit with the distributor. To remove distributor, disconnect Electrolock from dash, disconnect manual advance rod and remove distributor head with cables intact. Then remove set screw in side of shaft housing and pry up distributor until it can be lifted from place.

Oiling:—Fill the grease cup on the side of the shaft with medium grease and turn down one turn every month or each 1000 miles. Remove the head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam every 1000 miles.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (6 degrees or 3 teeth on the flywheel past top dead center). If the second set of contacts are not beginning to open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts separate when the piston entering power stroke reaches a position 6 degrees or 3 teeth on the flywheel past top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until a point on the flywheel 3 teeth past the dead center mark '1-8DC' is opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.



AUBURN

MODEL 8-95 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $17/32$ inches. Stem diameter, .3425-.341 inch. Stem length, $5\frac{1}{4}$ inches. Valve lift, $11/32$ inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $13/32$ inches. Stem diameter, .3425-.341 inch. Stem length, $5\frac{1}{4}$ inches. Valve lift, $11/32$ inch. Spring pressure, 47 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked '1-8DC' for inlet opening. Valve stem guides are removable. Oversize valves are made.

STARTER:—Model 716-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 90 R.P.M. drawing 150 amperes at 6 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175°F . cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 21 amperes (cold) reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000
Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.					

Mounting:—Generator is mounted on special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off drive belt. Then remove two bolts mounting generator on bracket and lift generator from place.

Belt Adjustment:—To adjust belt tension, loosen bracket bolts and adjustment clamp bolt and swing generator away from the engine until the proper belt tension is secured. Tighten the bolts. Do not get too much belt tension or it will crowd the generator bearings.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Soreng Manegold Switch. Switch is mounted at lower end of steering column. Dimming is by resistance mounted on switch. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome, corner and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted on block on dash is 20 ampere capacity.

AUBURN

MODEL 125 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

BATTERY:—U.S.L. Type XY-15X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under front seat on right side.

IGNITION:—Coil Model 528-C. Coil is mounted under the cowl. Ignition current is 4 amperes at 6 volts with engine running and 6 amperes at 6 volts with engine stopped.

Distributor Model 675-N. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees (equal to 90 degrees of crank-shaft rotation). Contacts must be synchronized to secure this result, for correct engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees. Maximum automatic advance is 18 degrees. The ignition switch is an Electrolock.

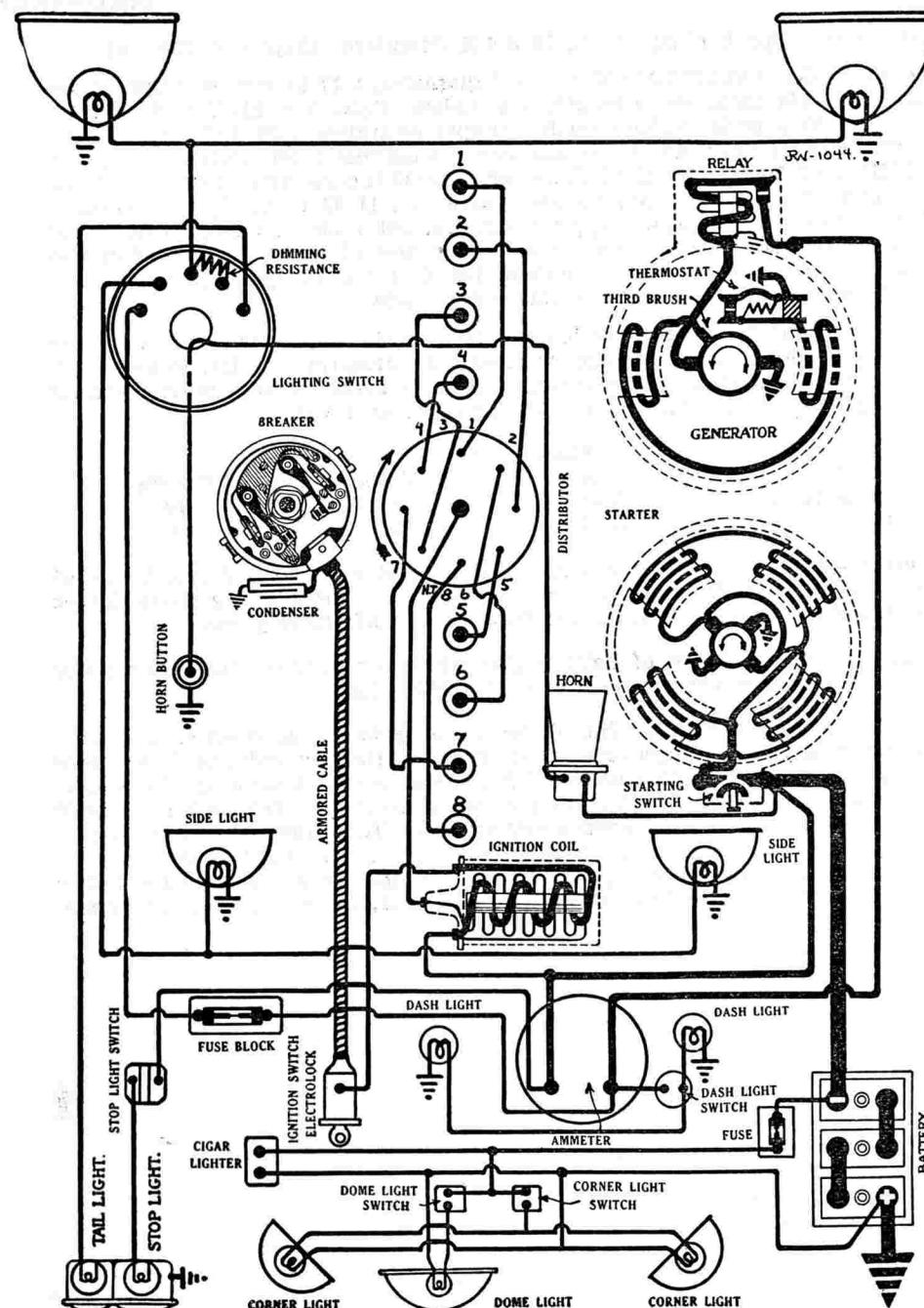
Mounting:—Distributor is mounted on the cylinder head and can be removed from the right side. The Electrolock must be removed as a unit with the distributor. To remove distributor, disconnect Electrolock at dash, disconnect manual advance rod and remove distributor head with cables intact. Then remove set screw in side of shaft housing and pry distributor up until it can be lifted from place.

Oiling:—Fill the grease cup on the side of the shaft with medium grease and turn down one turn every month or each 1000 miles. At the same time, remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contact.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without use of tool after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (3 teeth on the flywheel past top dead center with fully retarded spark). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees or 3 teeth on the flywheel past top dead center with the spark lever fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until a point on the flywheel 3 teeth past the dead center mark '1-8DC' is opposite the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begins to separate. Tighten the clamp screw and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.



AUBURN
MODEL 125 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, .3425-.341 inch. Stem length, $4\frac{1}{8}$ inches. Valve lift, $11/32$ inch. Spring pressure, 45.5 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center. The flywheel is marked '1-8DC' for inlet opening.

EXHAUST VALVES:—Head diameter, $1\frac{15}{32}$ inches. Stem diameter, .3425-.341 inch. Stem length, $4\frac{1}{8}$ inches. Valve lift, $11/32$ inch. Spring pressure, 45.5 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are made.

STARTER:—Model 718-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 100 R.P.M. drawing 200 amperes at 6 volts.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	.5.....	65.....
15 ".....	Lock.....	3.15.....	570.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-J. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 175°F . cutting the resistance across the thermostat contacts in series with the field

and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard setting, maximum charging rate is 21 amperes (cold) at 8.5 volts reached at 1450 R.P.M.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450.....	9-12.....	7.35-7.65.....	1800-2000.....
Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.					

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take off plate on front of chain case. Take out cap screws in generator flange, lift off drive chain and hang up in gear case with wire so that it can not slip off cam-shaft sprocket. Then pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Soreng Manegold Switch. Switch is mounted at lower end of steering column. Dimming is by resistance on switch. Headlights are 6-8 volt, 21 cp. S.C. Mazda 1129. Side or cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome, corner and tail lights are each 6-8 volt, 3 cp. S. C. Mazda 63.

FUSES:—Lighting fuse on block on dash is 20 ampere capacity.

BUICK
SERIES 40 (118 INCH WHEELBASE 1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-MXV-13-1, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member.

IGNITION:—Coil Model 528-H. Coil is mounted on the timing gear case at the right of the engine. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type steering post and ignition switch lock.

Distributor Model 640-Y. Breaker contacts separate .018-.024 inch. Set contact gap by loosening stationary contact mounting plate lock screw (located directly behind contacts) and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 24 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 34 degrees reached at 3400 R.P.M. of engine.

Mounting:—Distributor is mounted in a well on the commutator end of the generator. To remove distributor, disconnect primary lead and manual advance rod. Remove head with high tension cables intact. Remove advance arm stop screw and lift distributor from place.

Oiling:—Distributor shaft is oiled from the gear case. Oil gears with Zerk gun through connection on side of gear compartment every 500 miles. Remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam every 2000 miles.

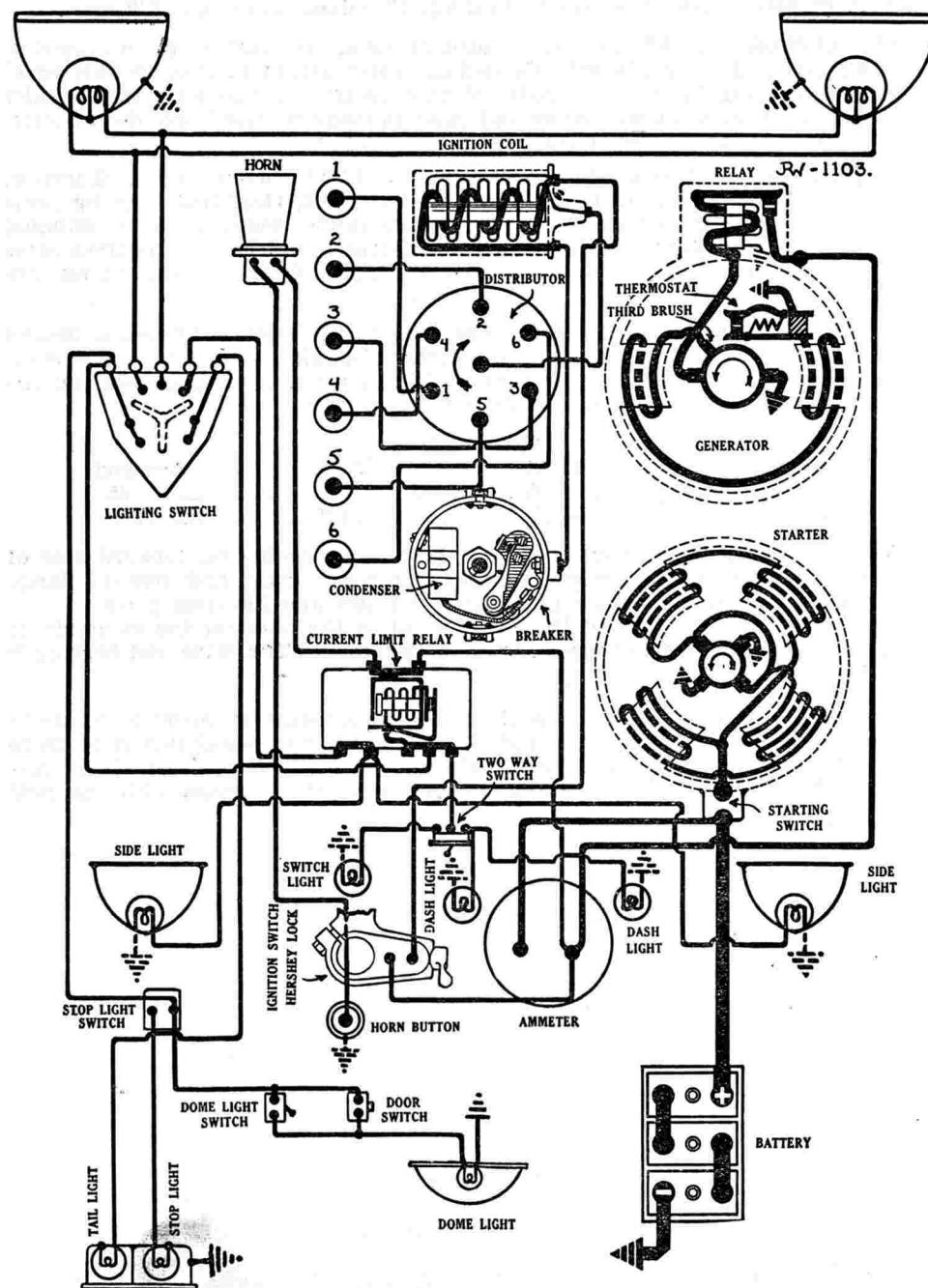
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 15 degrees before top dead center (measured on the flywheel) with the manual advance lever fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This is the up stroke with both valves closed. Fully advance spark lever. Remove cover over peephole in crankcase over flywheel, on right side of engine, and continue to crank engine until the flywheel mark is directly opposite the line on the edge of the hole. The rotor must be opposite the segment connected to the spark plug in cylinder No. 1 (see diagram). If it is not, remove manual advance stop screw and lift distributor to disengage gears. Then rotate rotor and shaft until rotor is directly opposite proper segment, remesh gears and replace stop screw. Then loosen the advance arm clamp screw and rotate distributor housing until contacts begin to separate. Connect the segment opposite the rotor to spark plug in cylinder No. 1 and connect remaining plugs in order 4-2-6-3-5 clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are A.C. Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 4 9/64 inches. Valve lift, .337 inch. Spring pressure, 44-56 pounds (valve closed) and 125-141 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open 1 degree after top dead center and close 51 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 4 9/64 inches. Valve lift, .337 inch. Spring pressure, 44-56 pounds (valve closed) and 125-141 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 52 degrees before lower dead center and close 23 degrees after top dead center. Valve stem guides are



BUICK

SERIES 40 (118 INCH WHEELBASE 1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

STARTER:—Model 725-D. Starter is connected to the engine through a mechanical gear shift. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	60
16 "	Lock	3	600

Mounting:—Starter is flange mounted at the right of the engine on the forward side of flywheel housing. To remove starter, disconnect starting pedal linkage and cable. Remove flange mounting screws and pull starter forward. Lift unit from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearings are oilless. They require no attention.

GENERATOR:—Model 940-M. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove commutator cover band and loosen the small round headed screw on the end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data					
Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Generator motoring draws 5.5-6 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 22-26 ounces.

Mounting:—Generator is mounted at the right of the engine on the timing gear case. To remove generator, disconnect lead and water pump. Remove the distributor. Remove mounting screws and pull generator to the rear and out.

Oiling:—Put 8 or 10 drops of light oil in the oiler on the commutator end of the generator every 500 miles. The drive end bearing is oiled by splash from the timing gear case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at approximately 8 miles per hour when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Switch Model 484-F. Lighting switch is mounted at the base of the steering column. Headlights are 6-8 volt, 21-21 cp. (double filament-double contact) Mazda 1110. Side, dash, tail and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing light is 15 cp. S.C. Mazda 87.

CURRENT LIMIT RELAY:—Model 410-A. A vibrating circuit breaker is mounted on the back of the dash. It begins to operate with a current of 25-30 amperes and continues to vibrate limiting the current to 10-15 amperes until the short circuit is repaired.

BUICK
SERIES 50 (124 INCH WHEELBASE) (1930)
SERIES 60 (132 INCH WHEELBASE) (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-MXV-15-1, 6 volt, 13 plate. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 133 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 24 hours. Battery is mounted on the right frame member.

IGNITION:—Coil Model 528-H. Coil is mounted on the timing gear case at the right of the engine. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incidental ignition switch and steering post lock.

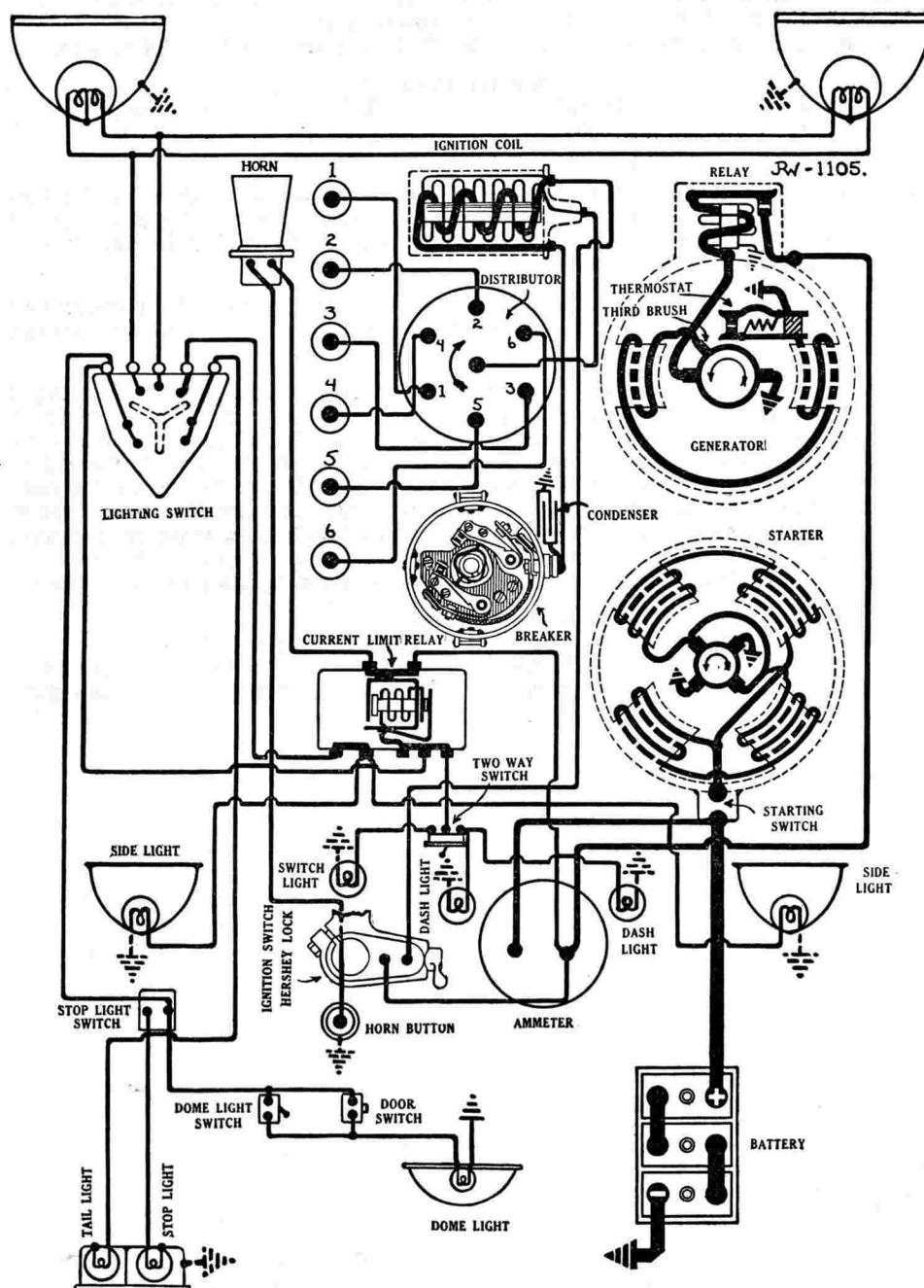
Distributor Model 650-B. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 24 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 24 degrees reached at 2600 R.P.M. Breaker has two sets of contacts operating on a three sided cam. Contacts open alternately at intervals of 60 degrees corresponding to the 120 degree firing interval of the engine. The contacts must be synchronized for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the commutator end of the generator. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then remove advance arm stop screw and lift distributor from place.

Oiling:—Distributor shaft is oiled from the gear case. There is a grease connection on the side of the gear compartment. Fill the gear compartment with a grease gun every two weeks or each 500 miles. Every 2000 miles remove the distributor head and rotor and put 4 or 5 drops of light oil in the wick oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Timing Distributor to Engine.** Breaker contacts begin to separate when the piston entering power stroke reaches a position 17 degrees (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke. Fully advance spark control lever. Remove cover over inspection hole in crankcase directly over flywheel and continue to crank engine over until the 17 degree mark on the flywheel is directly in line with the edge of the hole. The rotor must be opposite the segment connected to the spark plug in cylinder No. 1. If it is not, remove advance arm stop screw and lift distributor to disengage gears. Then turn rotor until it is directly opposite the correct segment and remesh gears. Replace the stop screw. Then loosen advance arm clamp screw and rotate distributor until the set of contacts mounted directly on the base plate begin to open. Tighten the clamp screw. Connect the spark plugs in order 1-4-2-6-3-5 clockwise around the distributor head.

Synchronization of Contacts. The contacts must be synchronized to secure the correct firing interval between the opening of the two sets of contacts. To synchronize contacts, use special Delco-Remy tool, Part No. 820751. Full directions will be found in Equipment section under 'Delco-Remy Distributors.' Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over 120 degrees from firing position of piston No. 1 when piston No. 4 will reach firing



B U I C K

SERIES 50 (124 INCH WHEELBASE) (1930)
SERIES 60 (132 INCH WHEELBASE) (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

position. If the second set of contacts do not open at this point, loosen the two lock screws on the sub-plate on which contacts are mounted and turn eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the breaker gap. It must be within limits of .018-.024 inch.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{1}{8}$ inches. Stem diameter, $\frac{3}{8}$ inch. Valve lift, 21/64 inch. Spring pressure, 44-56 pounds (valve closed) and 125-141 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open 17°54' after top dead center and close 52°30' after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, $\frac{3}{8}$ inch. Valve lift, 21/64 inch. Spring pressure, 44-56 pounds (valve closed) and 125-41 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 50°20' before lower dead center and close 20°4' after top dead center. Valve stem guides are removable.

STARTER:—**Model 725-D.** Starter is connected to the engine through a mechanical pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5.....	60.....
16 "	Lock.....	3.....	600.....

Mounting:—Starter is flange mounted at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect starting pedal linkage and starter cable. Then take out flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—**Model 940-M.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small

round headed screw on the outside of the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20.....	8.35-8.5.....	1450.....	9-12.....	7.35-7.65.....	1800-2000.....

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 22-26 ounces. Generator motoring draws 5.5-6 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, first disconnect all ignition wiring or remove distributor. Disconnect generator lead and water pump drive coupling. Take out generator mounting screws. Pull generator to the rear and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—**Model 265-B.** Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—**Delco-Remy Switch Model 484-F.** Lighting switch is mounted at base of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, tail and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—**Model 410-A.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. Circuit breaker begins to operate when the current reaches 25-30 amperes and continues to vibrate limiting the current to 2-15 amperes. Contacts separate .012-.030 inch. Air gap is .015-.025 inch.

CADILLAC

SERIES 353. SERIAL NUMBERS 500,001 UP
 PRODUCTION STARTED AUGUST 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXV-15-2G, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted on the right frame member under the dust shield.

IGNITION:—Coil Model 530-B. Coil is mounted on the radiator brace rods directly over the distributor. Ignition current is 2.5 amperes with engine running and 2 amperes with engine stopped.

Distributor Models 4050, 4056, 4055. Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Tighten the lock nut. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 40 degrees (engine). Automatic advance begins at 1000 R.P.M. (engine). Maximum automatic advance is 30 degrees reached at 3800 R.P.M. Breaker has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for correct performance. See Timing. Ignition switch is Delco-Remy Dual Lock Model 426-L, 426-M or 426-P.

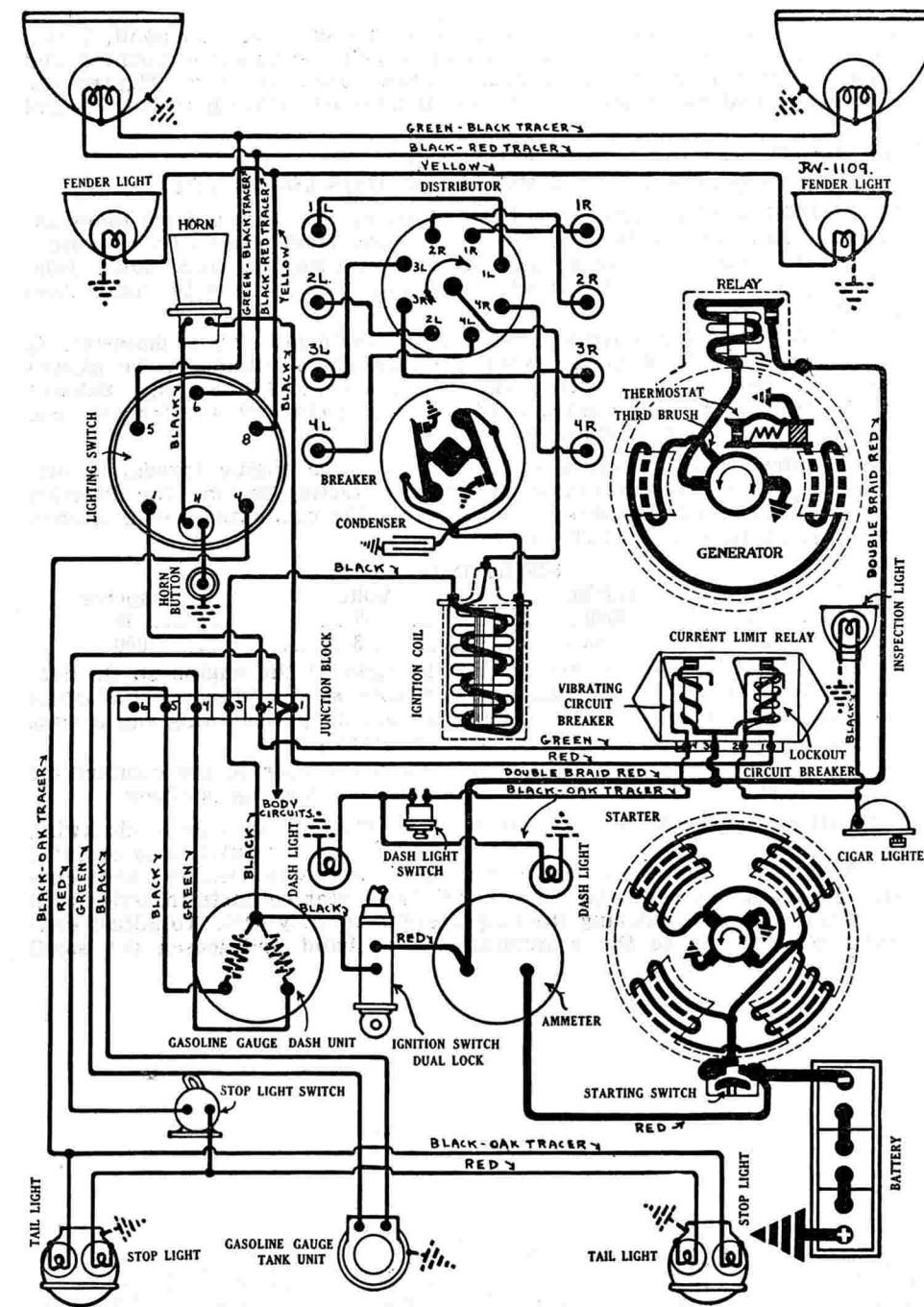
Mounting:—Distributor is mounted at the front of the engine between the cylinder blocks. To remove distributor, disconnect primary lead and spark control rod and remove distributor head with cables intact. Then take out two hold-down screws and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 1000 miles of operation. At the same time put a drop of oil on the breaker arm pivot pins and in the hole drilled in the top of the breaker cam which oils the path of the breaker arm rubbing blocks on the face of the cam.

Timing:—**Synchronization of Contacts.** The interval between the opening of the two sets of contacts must be exactly 45 degrees (distributor). This can be set by using special Delco-Remy Tool, Part No. 822572, and following directions on Distributors in Equipment section. The breakers may be synchronized without use of the tool after the distributor has been timed to the engine by cranking the engine over 90 degrees from the firing position of piston No. 1 when the flywheel mark 'IG/A-2-6' will be opposite the indicator. If the second set of contacts does not open at this point, the lock screws on the breaker arm mounting plate should be loosened and the eccentric adjusting screw turned until the contacts begin to open. Then tighten the lock screws and check the contact gap.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $2\frac{1}{2}$ inches (on the flywheel) before top dead center with the spark control lever in the fully advanced position. With piston No. 1 in firing position the flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel case. This mark is $2\frac{1}{2}$ inches before the top dead center position of the piston. To set timing, crank engine over until piston No. 1 reaches firing position. Fully advance spark control lever. Then loosen taper screw in center of breaker cam and rotate cam until the set of contacts mounted on the stationary breaker plate begin to open. Tighten the screw and check to see that segment directly opposite rotor is connected to the spark plug in cylinder No. 1. The second set of contacts open exactly 45 degrees after this point.

NOTE:—Distributor Model 4050 as used on first 1734 cars has the con-



CADILLAC

SERIES 353. SERIAL NUMBERS 500,001 UP

PRODUCTION STARTED AUGUST 1929

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

the condenser is mounted on the outside of the case. Distributor Model 4055 is used beginning with Serial No. 3146.

Firing Order:—The firing order is IL-4R-4L-2L-3R-3L-2R-1R. Cylinder banks are right and left as viewed from the driver's seat. No. 1 cylinder is nearest the radiator.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .025-.028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.785-1.791 inch. Stem diameter, $\frac{3}{8}$ inch. Stem length, $6\frac{1}{8}$ inches. Valve lift, $23/64$ inch. Spring pressure, 79 pounds compressed to $2\frac{1}{2}$ inches (valve closed). Tappet clearance, .004 inch (cold). Inlet valves open 11 degrees before top dead center and close 59 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.696-1.702 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, $6\frac{7}{64}$ inches. Valve lift, $23/64$ inch. Spring pressure, 79 pounds compressed to $2\frac{1}{2}$ inches (valve closed). Tappet clearance, .006 inch (cold). Exhaust valves open 48 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model 728-D.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch and an overrunning clutch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
28 "	Lock	3	600

Mounting:—Starter is mounted at right of engine on rear of flywheel case. To remove starter, disconnect cable and starting pedal linkage and take out three flange mounting cap screws. Then pull starter to rear to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—**Model 927-D.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at approximately 165°F . cutting the resistance in series with the field and reducing the output 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw in the end plate. Then shift the third brush mounting plate by hand. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after mak-

ing the adjustment. The maximum standard charging rate is 10-12 amperes (hot) at 7.3-7.7 volts reached at 1600 R.P.M. or 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20	8.2-8.6	1450	10-12	7.3-7.7	1600

Brush spring tension is 16-20 ounces. Generator field current is 1.8-2.3 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take out lower flange mounting cap screw and remove nuts on upper flange mounting bolts. Then pull generator to rear to disengage coupling and lift from place.

Drive Chain Adjustment:—To adjust generator and water pump drive chain, loosen two pivot screws and nuts on flange mounting. Then force water pump away from engine until chain is tight. Then back off approximately $\frac{1}{8}$ inch and tighten mounting screws and nuts.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 500 miles of operation.

RELAY:—**Model 266-N.** Relay is mounted on the generator. Relay closes at 420 R.P.M. or 8-10 miles per hour when the generator voltage reaches 7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.021 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—**Switch Model 486-H.** Lighting switch is mounted at lower end of the steering column. Double filament headlights using the second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights or parking lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—**Model 5759.** This device consists of a vibrating and lockout circuit breaker mounted on the dash. The vibrating unit protects the lighting circuits. It starts to operate when the current reaches 25-30 amperes and continues limiting the current to 5-15 amperes. The lockout circuit breaker protects the horn, stop light, inspection light, cigar lighter and body light circuits. It begins to operate when the current reaches 25-30 amperes and continues limiting the current to less than 1 ampere. Contact gap is .012-.030 inch. Air gap between armature and coil core is .015-.025 inch. Plunger spring tension is 5 ounces.

CADILLAC
V-16 SERIES 452 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-XC-RV-21-2G, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted on the right frame member under the dust shield.

IGNITION:—Coil Model 530-G (2 used). Coils are mounted in a recess in the top tank of the radiator. Ignition current is 2 amperes at 6 volts with engine running and 2.5 amperes at 6 volts with engine stopped (each coil). The ignition switch is a Delco-Remy Dual-Lock.

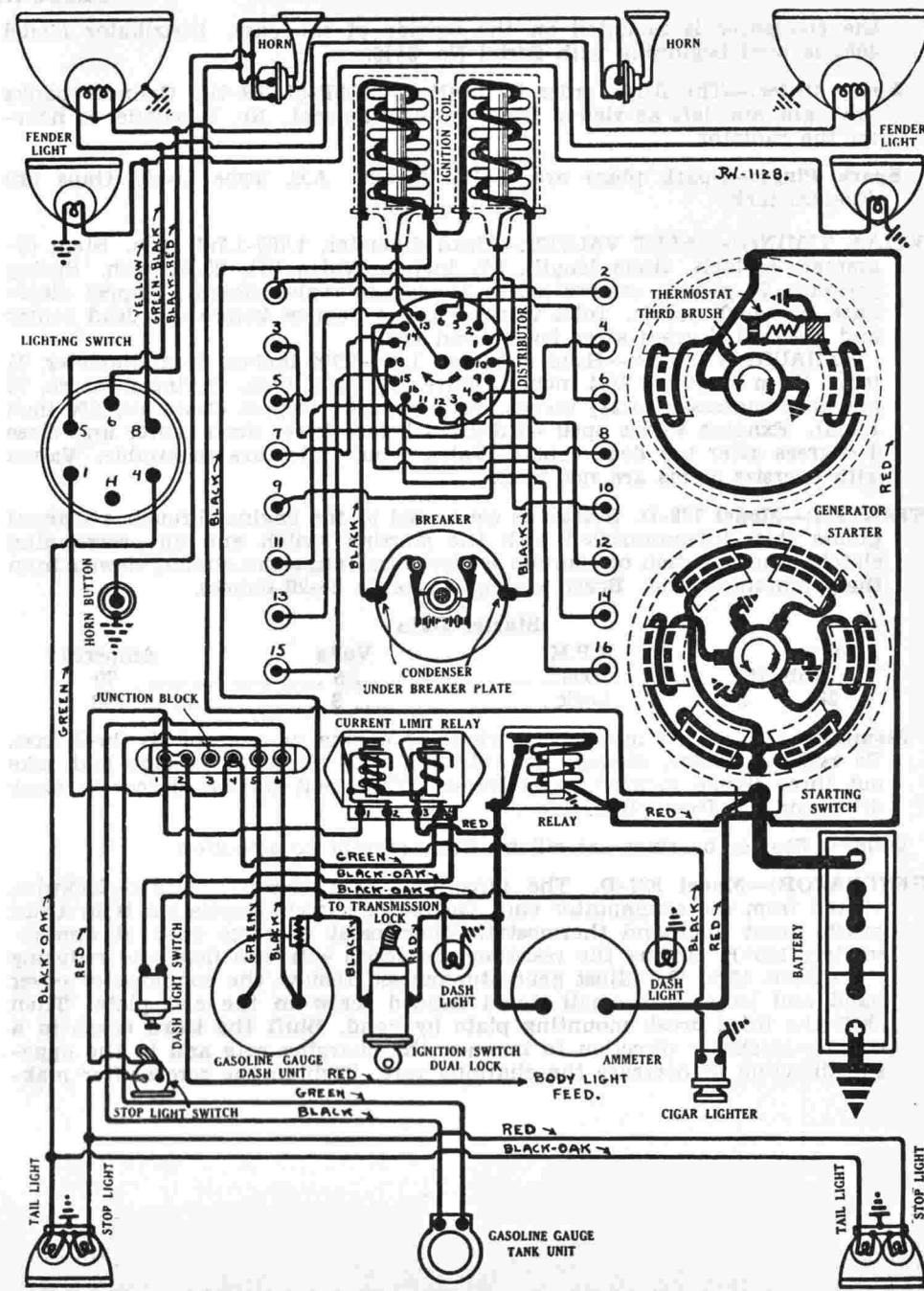
Distributor Model 4057. Breaker contacts separate .014-.018 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at 1100 R.P.M. Maximum automatic advance is 24 degrees (engine). Breaker has two sets of contacts operating on a single eight sided cam. Each set of contacts controls one ignition coil and fires the spark plugs in eight cylinders. Contacts open alternately at intervals of 22½ degrees corresponding to the 45 degree firing interval of the engine. The firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted between the cylinder banks at the front of the engine. To remove distributor, disconnect primary leads and manual advance rod and remove distributor head with cables intact. Then take out two hold-down screws and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every 1000 miles. At the same time remove the distributor head and rotor and put 2 or 3 drops of oil in the hole drilled in the top of the cam. This oiler oils the breaker arm rubbing blocks on the face of the breaker cam.

Timing:—**Timing Distributor to Engine.** Breaker contacts begin to separate when the piston entering power stroke reaches a position 10.5 degrees (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until No. 1L piston enters compression stroke (the up stroke with both valves closed). Fully advance the spark control lever. Crank engine over until the flywheel mark 'IG/A' which is 10½ degrees or 1¼ inches on the flywheel before the top dead center mark 'C/1-15' is opposite the indicator. Then loosen the taper lock screw in the center of the breaker cam and carefully locate cam so that one set of breaker contacts are beginning to open. Tighten the lock screw and see that the segment in the distributor directly opposite the rotor is connected to the spark plug in cylinder No. 1L. Connect the remaining spark plugs in accordance with the diagram. The firing order and numbering of the cylinders is given in accordance with Cadillac specifications.

Synchronization of Contacts. Contacts can be synchronized on a rotary spark gap or directly on the engine after the distributor has been timed to the engine by cranking engine over 45 degrees when piston No. 4R (No. 8) will reach firing position. If the second set of contacts do not separate at this point, loosen the lock screws on the movable sub-plate and shift position of plate until contacts begin to open. Tighten the lock screws and check the contact gap with breaker arm on lobe of cam.



CADILLAC

V-16 SERIES 452 (1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

Firing Order:—The firing order is 1-8-9-14-3-6-11-2-15-10-7-4-13-12-5-16 with spark plugs numbered as shown on the diagram. This firing order in conventional terms is 1L-4R-5L-7R-2L-3R-6L-1R-8L-5R-4L-2R-7L-6R-3L-8R with number 1 cylinder nearest the radiator and cylinder banks right and left as viewed from the driver's seat.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .025-.028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.446-1.452 inches. Stem diameter, .3392-.3397 inch. Valve length, 6 1/16 inches. Valve lift, 11/32 inch. Spring pressure, 65 pounds (valve closed) 130 pounds (valve open). Inlet valves open at top dead center and close 44 degrees after lower dead center. The flywheel is marked 'C/1-15' at point of inlet opening for cylinders Nos. 1L and 8L.

EXHAUST VALVES:—Head diameter, 1.446-1.452 inches. Stem diameter, .3392-.3397 inch. Valve length, 6 1/16 inches. Valve lift, 11/32 inch. Spring pressure, 65 pounds (valve closed) 130 pounds (valve open). Exhaust valves open 39 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

SPECIAL NOTE:—A special automatic valve tappet take-up is used. The rocker arm is mounted on an eccentric bushing which is rotated to take up the valve lash by a spring under the plunger which bears on an arm of the eccentric. The plunger operates in an oil cylinder. This device requires no attention in service and there will be no tappet clearance or lash.

STARTER:—**Model 457.** Starter is connected to the engine through a set of reduction gears and an overrunning clutch. The manual pinion shift is interconnected with the starting switch pedal. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	4000.....	4.....	60.....
19 ".....	Lock.....	3.....	500.....

Mounting:—Starter is flange mounted at right of engine on rear of flywheel housing. To remove starter, take up floor boards of front compartment and disconnect cable and leads at starting switch. Disconnect pedal rod at shifter yoke and take out three mounting cap screws. Then pull starter to rear to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the drive end of the starter every 1000 miles. Every six months repack the reduction gear case with medium grease.

GENERATOR:—**Model 927-E.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cut-

ting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18-20 amperes at 8.6 volts reached at 1400 R.P.M. or 23 miles per hour.

Generator Data			
Cold Test	Hot Test		
Amperes	Volts	R.P.M.	Amperes
18-20.....	8.2-8.62.....	1450.....	10-12.....

Brush spring tension is 16-20 ounces. Shunt field current is 1.8-2.3 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and water pump drive coupling. Take out three flange mounting cap screws. Pull generator to the rear to disengage drive coupling and lift from place.

Timing Chain Adjustment:—Timing chain is adjusted by shifting the generator. To take up timing chain, loosen the three mounting screws and pry the generator away from the engine as far as possible. Then back off $\frac{1}{8}$ inch and tighten the mounting screws. With correct adjustment, the chain should run noiselessly.

Oiling:—Put 8 or 10 drops of light engine oil in the generator oilers every 500 miles of operation.

RELAY:—**Model 266-N.** Relay is mounted on the left body sill under the dash. Relay contacts close at 420 R.P.M. (generator) when the generator voltage reaches 7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—**Delco-Remy Switch Model 486-D.** Lighting switch is mounted at lower end of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (on fenders) are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—**Model 5759.** This device consists of two circuit breakers mounted on the dash. A vibrating circuit breaker is connected in the lighting circuits. It begins to operate when the current reaches 25-30 amperes and continues limiting the current to 5-15 amperes. The lockout circuit breaker is connected in the stop light and body light circuits. It begins to operate with a current of 25-30 amperes and limits the current to less than 1 ampere. Contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

CHEVROLET
UNIVERSAL MODEL (1930) SERIAL NUMBERS AD-1001 UP
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Various types of batteries have been used. They are all six volt. The negative (—) terminal is grounded. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted on the right frame member under the floor boards of the front compartment.

IGNITION:—**Coil Model 528-C.** Coil is mounted on the front of the dash. Ignition current is 1.9 amperes at 7.5 volts with engine running at 40 M.P.H. and 4 amperes at 6 volts with engine stopped. The ignition switch is a Delco-Remy Electrolock, Type 427-B. The Electrolock must be removed as a unit with the distributor whenever the distributor is taken off the car. This Electrolock is fully described in the Equipment Section.

Distributor Model 633-G. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 13 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 35 degrees reached at 2400 R.P.M.

Mounting:—Distributor is mounted at right of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect Electrolock at dash, disconnect manual advance rod and remove distributor head with cables intact. Then loosen advance arm stop screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every month or each 1000 miles. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam.

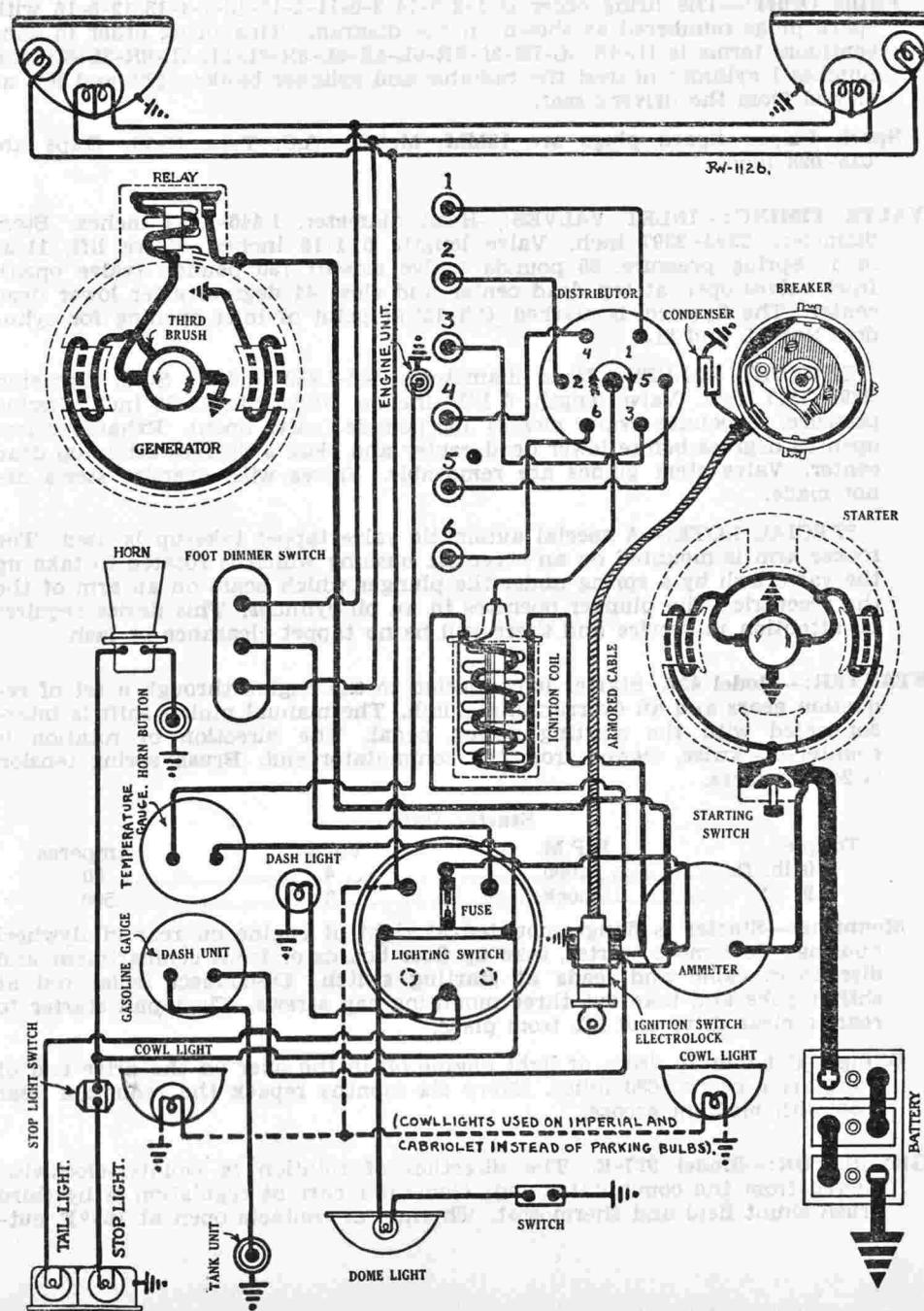
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 12 degrees (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and see that distributor is rotated counter-clockwise to the full extent of the advance arm slot. Turn engine over until the '12' mark on the flywheel will be opposite the indicator in the peep hole in the front face of the flywheel housing at the right of the engine. This is the firing position of No. 1 piston. Then loosen advance arm clamp screw and rotate distributor until breaker contacts begin to open. Tighten the clamp screw and check rotor position. The rotor must be directly opposite the segment connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type 140. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, 5/16 inch. Stem length, 4 23/32 inches. Valve lift, .277 inch. Spring pressure, 40 pounds. Tappet clearance, .006 inch (hot). Inlet valves open 4 degrees after top dead center and close 42 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 11/32 inches. Stem diameter, 5/16 inch. Stem length, 4 23/32 inches. Valve life, .277 inch. Spring pressure, 40 pounds. Tappet clearance, .008 inch (hot). Exhaust valves open 47 degrees after top dead center and close 4 degrees after lower dead center. Valve



CHEVROLET

UNIVERSAL MODEL (1930) SERIAL NUMBERS AD-1001 UP

PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 714-L. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 26 ounces. Starter cranks engine at 160 R.P.M. drawing 150 amperes at 4.2 volts. The starting switch is mounted on the starter field frame and is operated by a pedal on the toeboard.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	.5.....	65.....
14 ".....	Lock.....	3.63.....	475.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out the flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the starter every month or each 1000 miles.

GENERATOR:—Model 943-J. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 18 amperes (cold) reached at 1700 R.P.M. or 25 miles per hour.

Generator Data

Amperes	Cold Test		Hot Test		R.P.M.
	Volts	R.P.M.	Amperes	Volts	
17-18.....	.82.....	1700.....	12.....	7.7.....	1800.....



Motoring, generator draws 3 amperes at 6 volts. Shunt field current is 4.5-9 amperes at 6 volts. Brush spring tension is 16 ounces.

Mounting:—Generator is mounted at left of engine by special hinge bracket and is driven by the fan belt. To remove generator, disconnect lead and remove cap screw in adjustment clamp at front of generator. Then swing generator toward engine and slip off drive belt. Then take out bolts holding generator on bracket and lift generator from place.

Fan Belt Adjustment. Fan belt tension is adjusted by loosening clamp screw on adjustment arm at front of generator and swinging generator away from the engine. The belt tension should be just sufficient to drive fan and generator without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light oil in the oiler at each end of the generator every month or each 1000 miles.

RELAY:—Model 265-H. Relay is mounted on the generator. Relay contacts close at 750 R.P.M. or 7.5 miles per hour when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 478-C. Lighting switch is mounted on the dash. Double filament headlight bulbs are standard equipment using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Dimmer lights or parking lights in headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Side lights (used on some models) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuse mounted on back of lighting switch is 15 ampere capacity.

CHRYSLER

NEW SIX SERIES CJ (1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 21998. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is 2.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Type 10843. Breaker contacts separate .018-.023 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until gap is .020 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic. Maximum automatic advance is 13 degrees.

Mounting:—Distributor is mounted at left of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

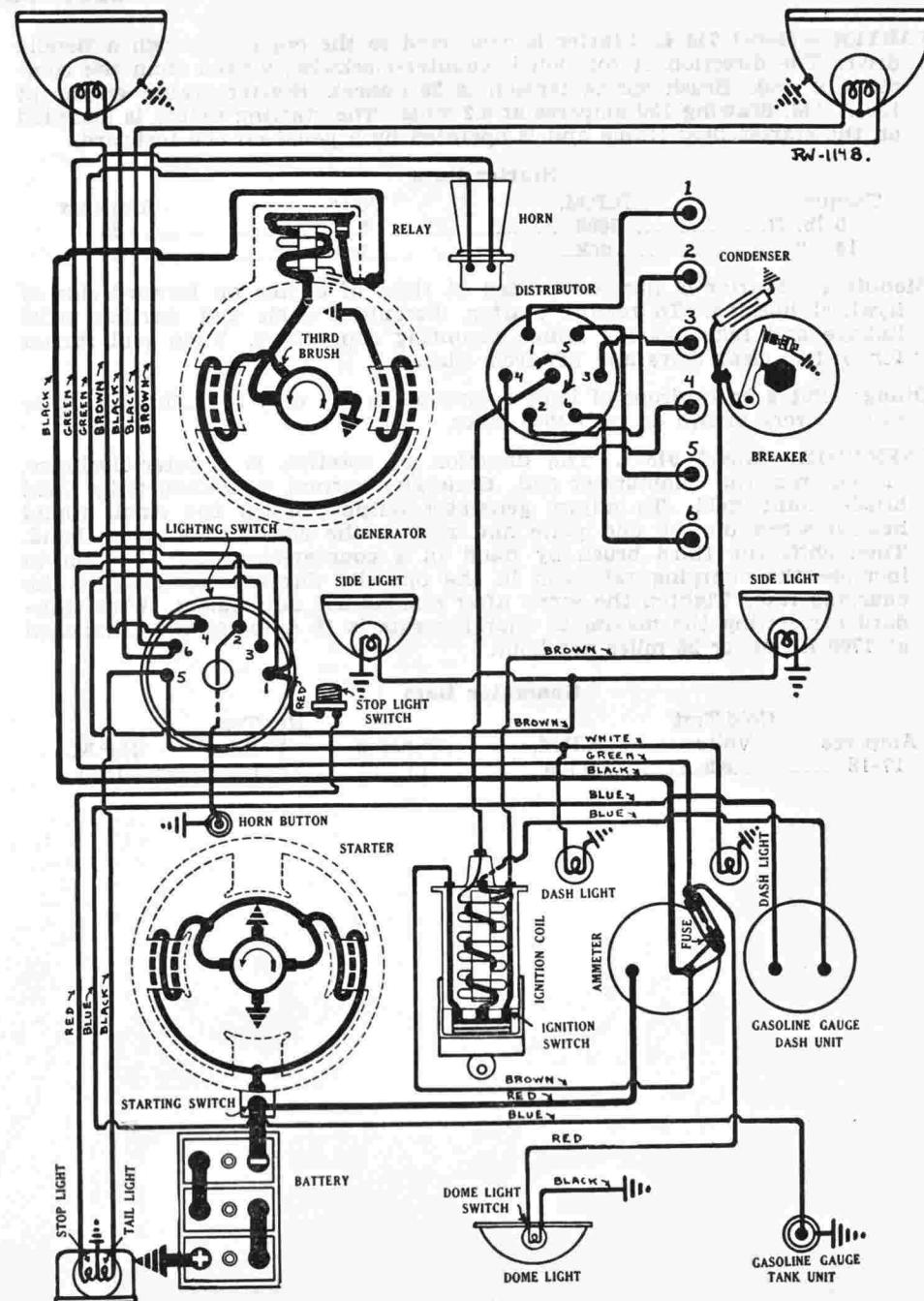
Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every 500 miles of operation. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pin. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .009 inch before top dead center. To set timing, first set breaker gap at .020 inch. Then remove the small brass pipe plug in the cylinder head directly above No. 6 piston and screw the special micrometer timing gauge in place in the hole. Connect a small six volt test lamp in the ignition circuit by connecting one test lamp lead to the primary terminal on the distributor and connecting the other lead to the relay terminal of the generator. If the battery is out of the car, connect this lead to a battery and ground the other battery terminal to the car frame. With these connections the lamp will remain lighted while the contacts are closed and will go out as the contacts open. Then turn the engine over and set the micrometer gauge at '0' with No. 6 piston on top dead center. Then turn engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed) and stop when the gauge reading is .009 inch before top dead center. This is the firing position of No. 1 cylinder. Then loosen the advance arm clamp screw and rotate the distributor until the test lamp goes out, indicating that the contacts have begun to open. Tighten the clamp screw and see that the rotor is directly opposite No. 1 segment in the distributor head (see diagram).

Check ignition setting by cranking engine over several times and then stopping with No. 1 piston on compression stroke at the instant the test lamp goes out. The gauge reading must be within limits of .004-.014 inch before top dead center. If outside these limits the engine must be retimed.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .027-.030 inch.



CHRYSLER
NEW SIX SERIES CJ (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.469 inches. Stem diameter, .3405 inch. Valve length, 5 $\frac{1}{4}$ inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) 78 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 5 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.469 inches. Stem diameter, .3405 inch. Valve length, 5 $\frac{1}{4}$ inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) 78 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 714-Q. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

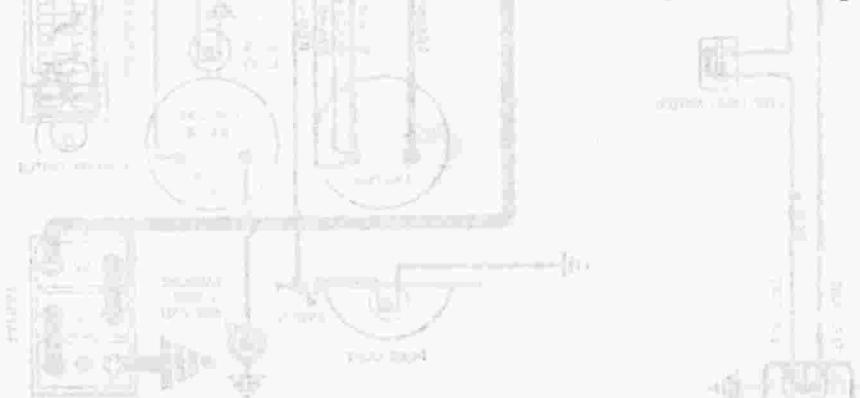
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000.	5	65
.4 "	3250.	5.5	100
3.0 "	1500.	5.0	200
6.0 "	800.	4.5	300
9.4 "	350.	4.0	400
13 "	Lock.	3.5	500

Mounting:—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and starting pedal linkage and take out two flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

GENERATOR:—Model 943-L. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate.



Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
0	6.4	760	0
6	7.0	1000	6
10	7.4	1200	10
16	8.0	2300	12.5
12	7.7	3200	10

Shunt field current is 3.5-4.5 amperes at 6 volts. Generator motoring draws 3 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at left of engine on special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then remove two bolts holding generator on bracket and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuse mounted on back of ammeter is 20 ampere capacity.

CHRYSLER
MODEL 66, SERIES CC (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 526-Z. The ignition switch is built in the base of the coil. Coil is mounted on the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 639-X. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until gap is .020 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 15-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2600 R.P.M. of engine.

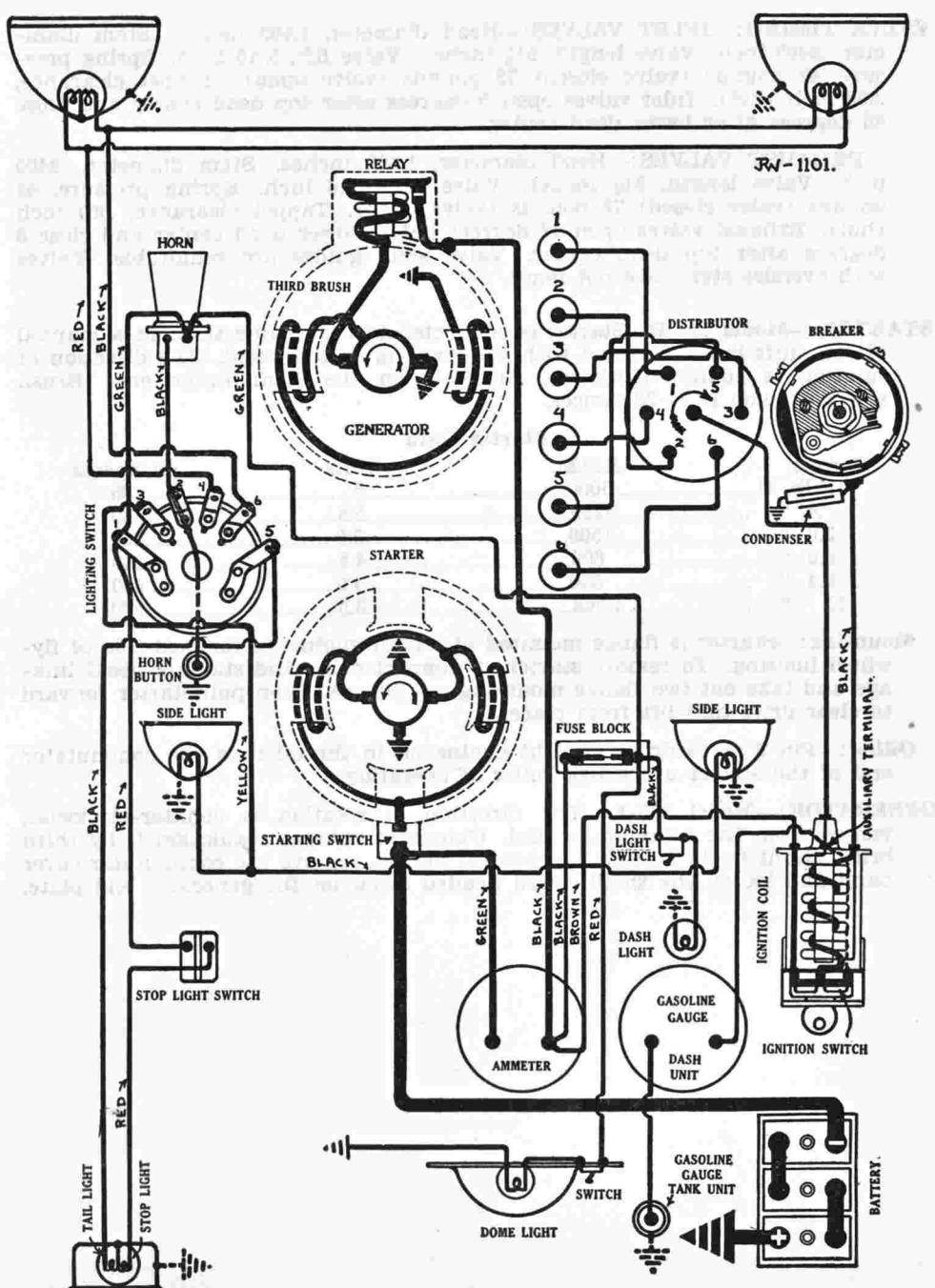
Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one turn every 500 miles of operation. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pin. At the same time put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 10 degrees (on the flywheel) or .035 inch before top dead center with the manual spark control fully advanced. To set timing, first check distributor assembly. The rotor should be directly opposite No. 1 segment (see diagram) with slot in drive shaft parallel to the center line of the crankshaft when No. 1 piston is on top dead center. Set contact gap at .020 inch. Remove the $\frac{1}{8}$ inch pipe plug in the cylinder head directly above No. 6 piston and screw a special timing micrometer in place. Connect one lead of a small six volt test lamp to the primary terminal of the distributor and connect the other lead to the relay terminal on the generator. If the battery is out of the car, connect this lead to one terminal of a battery and ground the other battery lead to the car frame. Then fully advance manual spark control. Turn the engine over until No. 6 piston reaches top dead center and set micrometer gauge at zero. Then turn engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Stop when the gauge indicates the piston is .035 inch before top dead center. The test lamp should go out at this instant, indicating that the contacts are beginning to open. If it does not, loosen the advance arm clamp screw and rotate the distributor until the contacts open. Tighten the clamp screw and check the setting by turning the engine over several times and then stop with No. 1 piston on compression stroke at the point of contact opening when the lamp goes out. The gauge reading should be within limits of .030-.040 inch. If outside these limits, the timing operation must be repeated.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type 110. Gaps are .027-.029 inch.



CHRYSLER
MODEL 66, SERIES CC (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.594 inches. Stem diameter, .3405 inch. Valve length, 5 51/64 inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) and 78 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 6 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.531 inches. Stem diameter, .3405 inch. Valve length, 5 51/64 inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) and 78 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 714-P. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000.	.5	65
.4 "	3250.	5.5	100
3.0 "	1500.	5.0	200
6.0 "	800.	4.5	300
9.4 "	350.	4.0	400
13 "	Lock.	3.5	500

Mounting:—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out large pilot mounting screw and lock nut from flywheel housing directly above starter sleeve. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 943-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover

band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18 amperes (cold) reached at 1750 R.P.M.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
0	6.4	650	0
4	6.8	800	4
8	7.3	920	10
12	7.7	1080	13.5
18	8.3	1750	10
11.6	7.6	3200	

Brush spring tension is 14-18 ounces. Shunt field current is 3.5-4.5 amperes. Generator motoring draws 5.5 amperes at 6 volts.

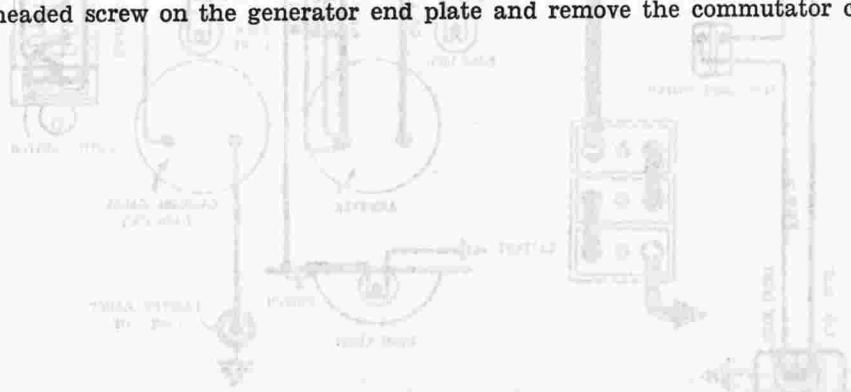
Mounting:—Generator is mounted on special swinging bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then take out two bolts holding generator on bracket and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail light is 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted on back of ammeter is 20 ampere capacity.



CHRYSLER
MODEL 70, SERIES V (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 526-T. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 ampere at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

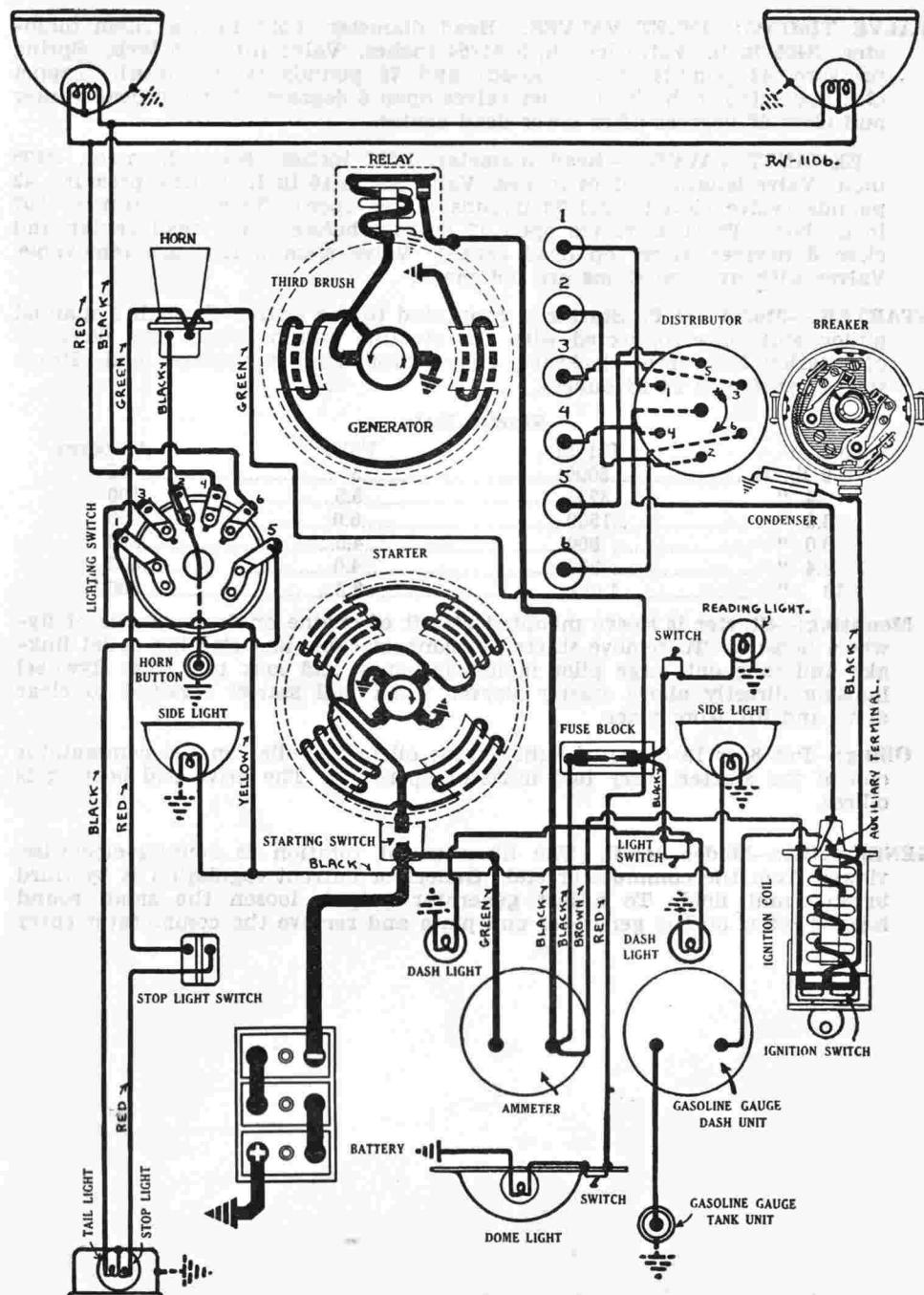
Distributor Model 650-G. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 2750 R.P.M. of engine. Breaker has two sets of contacts operating on a single three sided cam. Contacts open alternately at intervals of 60 degrees corresponding to the 120 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and may be removed from the right side. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every 500 miles of operation. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Timing Distributor to Engine.** Breaker contacts begin to separate when the piston entering power stroke reaches a position .067 inch before top dead center with the manual spark control in the fully advanced position. To set timing, first set breaker contacts at .022 inch. Then remove the small brass pipe plug in the cylinder head directly above No. 6 piston and screw the special timing micrometer gauge in place. Connect a small six volt test lamp in series with the primary circuit by connecting one test lamp lead to the primary terminal and the other lead to the relay terminal on the generator. If the battery is out of the car connect this lead to a six volt battery and ground the other battery terminal to the car frame. Then crank the engine over and set the micrometer gauge at '0' with No. 6 piston on top dead center. Fully advance the manual spark control and see that distributor is turned counter-clockwise to the full extent of the advance arm slot. Turn engine over until piston No. 1 enters compression stroke and stop when the gauge reading is .067 inch before top dead center. Then loosen advance arm clamp screw and rotate distributor until the test light goes out, indicating that the contacts are opening. Tighten the clamp screw and see that the rotor is directly opposite the segment in the distributor head connected to the spark plug in cylinder No. 1 (see diagram).

Check the ignition setting by turning the engine over several times and then stopping with piston No. 1 on compression stroke at the instant the test lamp goes out, indicating that the contacts have opened. The gauge reading should be within limits of .060-.084 inch. If outside these limits the timing operation must be repeated.



CHRYSLER
MODEL 70, SERIES V (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Synchronization of Contacts. Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 829751, and follow directions given in Equipment Section. It will not be possible to synchronize contacts without special equipment as no provision is made for timing the engine on any other cylinder than No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type 130. Gaps are .027-.030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.719 inches. Stem diameter, .3405 inch. Stem length, 7 1/16 inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) 78 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 6 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.656 inches. Stem diameter, .3405 inch. Stem length, 7 1/16 inches. Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) 78 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 728-B. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch and a set of reduction gears. The direction of rotation (armature shaft) is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	.56	75
.6 "	1550	5.5	100
5 "	780	5.0	200
10 "	460	4.5	300
15.4 "	270	4.0	400
28 "	Lock	3.0	600

Mounting:—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out the large pilot mounting screw and lock nut in flywheel housing directly above starter sleeve. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the armature shaft every 1000 miles of operation. Every six months remove the grease plug in the reduction gear case and repack gears with graphite grease.

GENERATOR:—Model 957-G. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18 amperes (cold) at 8.3 volts reached at 1750 R.P.M.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
0	.64	520	0
6	7.0	720	4
10	7.4	820	8
14	7.8	1020	14
18	8.3	1700	10
11.4	7.6	3200	

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 16-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is mounted on special swinging bracket at left of en-

gine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and lift off drive belt. Then take out two bolts mounting generator on bracket and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted on back of ammeter is 20 ampere capacity.

CHRYSLER
MODEL 77, SERIES W (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, WSB-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 528-E. Coil is mounted on the dash. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. The ignition switch is a Type 5-B Electrolock. The Electrolock must be removed as a unit with the distributor whenever the distributor is taken off the car. A full description and service directions on the Electrolock are given in the Equipment Section.

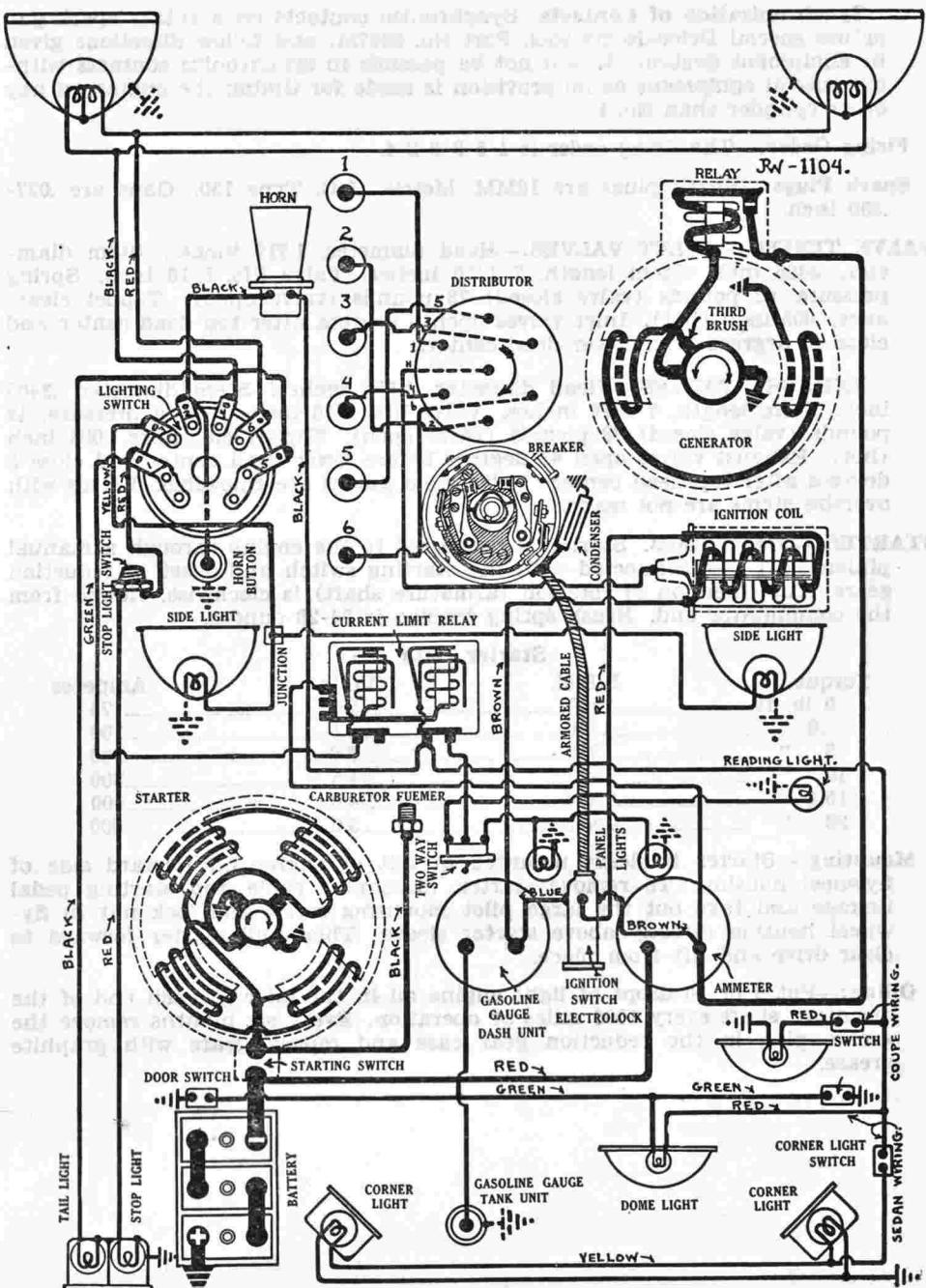
Distributor Model 659-E. Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2800 R.P.M. of engine. Breaker has two sets of contacts operating on a single three sided cam. Contacts open alternately at intervals of 60 degrees corresponding to the 120 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and may be removed from the right side. To remove distributor, disconnect Electrolock at dash, disconnect manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor and Electrolock from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every 500 miles of operation. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pins. Put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 829751, and follow directions given in Equipment Section. It will not be possible to synchronize contacts without special equipment as no provision has been made to time the engine on any cylinder than No. 1.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position .067 inch before top dead center with the manual spark control in the fully advanced position. To set timing, first set breaker contacts at .022 inch. Remove the $\frac{1}{8}$ inch pipe plug in cylinder head directly over No. 6 piston and screw the special micrometer timing gauge in place in the hole. Connect a small six volt test lamp in series with the primary circuit by connecting one test lamp lead to the coil lead to the Electrolock (Red wire) after disconnecting this lead from the Electrolock. Connect the other test lamp lead to the Electrolock terminal. Turn on ignition. Crank engine over and set micrometer gauge at '0' with No. 6 piston on top dead center. Fully advance manual spark control. Turn engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed) and stop when the gauge reading is .067, indicating that No. 1 piston is at firing position. Then loosen advance arm clamp screw and rotate distributor until the test lamp goes out, indicating that the contacts are beginning to open. Tighten the clamp screw and see that rotor is directly opposite No. 1 segment (see diagram). Connect the spark plugs as shown on the wiring diagram.



CHRYSLER
MODEL 77, SERIES W (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Check the ignition setting by cranking the engine over several times and then stopping with No. 1 piston on compression stroke at the exact point at which the test lamp goes out, indicating that the contacts have opened. The gauge reading should be within limits of .060-.084 inch. If outside these limits the timing must be reset.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type 130. Gaps are .027-.030 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1.719 inches. Stem diameter, .3405 inch. Stem length, 7 1/16 inches (over all). Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) and 78 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 6 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.656 inches. Stem diameter, .3405 inch. Stem length, 7 1/16 inches (over all). Valve lift, 5/16 inch. Spring pressure, 42 pounds (valve closed) and 78 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 728-B. Starter is connected to the engine through a set of reduction gears and manual pinion shift interconnected with the starting switch pedal. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5.6	75
.6 "	1550	5.5	100
5 "	780	5.0	200
10 "	460	4.5	300
15.4 "	270	4.0	400
28 "	Lock	3.0	600

Mounting:—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out large pilot mounting screw and lock nut on flywheel housing directly above starter sleeve. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the armature shaft every 1000 miles of operation. Every six months remove the grease plug in the reduction gear case and repack gears with graphite grease.

GENERATOR:—Model 959-D. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third

brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18 amperes (cold) reached at 1750 R.P.M. of the generator armature.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	520	0	6.4	600
6	7.0	720	4	6.8	760
10	7.4	820	8	7.7	1000
14	7.8	1020	14	7.8	2100
18	8.3	1800	10	7.4	3200
11.4	7.6	3200			

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is mounted on special swinging bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp band. Swing generator toward engine and slip off drive belt. Then take out two bolts mounting generator on bracket and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—Model 410-E. This device consists of two vibrating circuit breakers mounted on the back of the dash and connected in the lighting circuits. They begin to operate when the current reaches 25-30 amperes and continue limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

CORD

FRONT WHEEL DRIVE MODEL L-29 (1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

The Cord as America's first Front Wheel Drive automobile to be placed in production involves a number of new features. The engine, while essentially a stock engine, is reversed in the chassis with the flywheel and transmission at the forward end. The timing chain is likewise at the forward end between the engine block and the flywheel. The crankshaft revolves counter-clockwise. The starter drives to the flywheel and is mounted on the rear of the flywheel case which is thus the forward end of the engine. The battery is mounted near the starter on a bracket above the transmission case under the engine hood. The electrical units are similar to those used on ordinary rear wheel drive cars and no trouble should be experienced in service work.

BATTERY:—U.S.L. Type XY-15X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 119 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on special bracket directly above transmission case under the engine hood at the forward end of the engine.

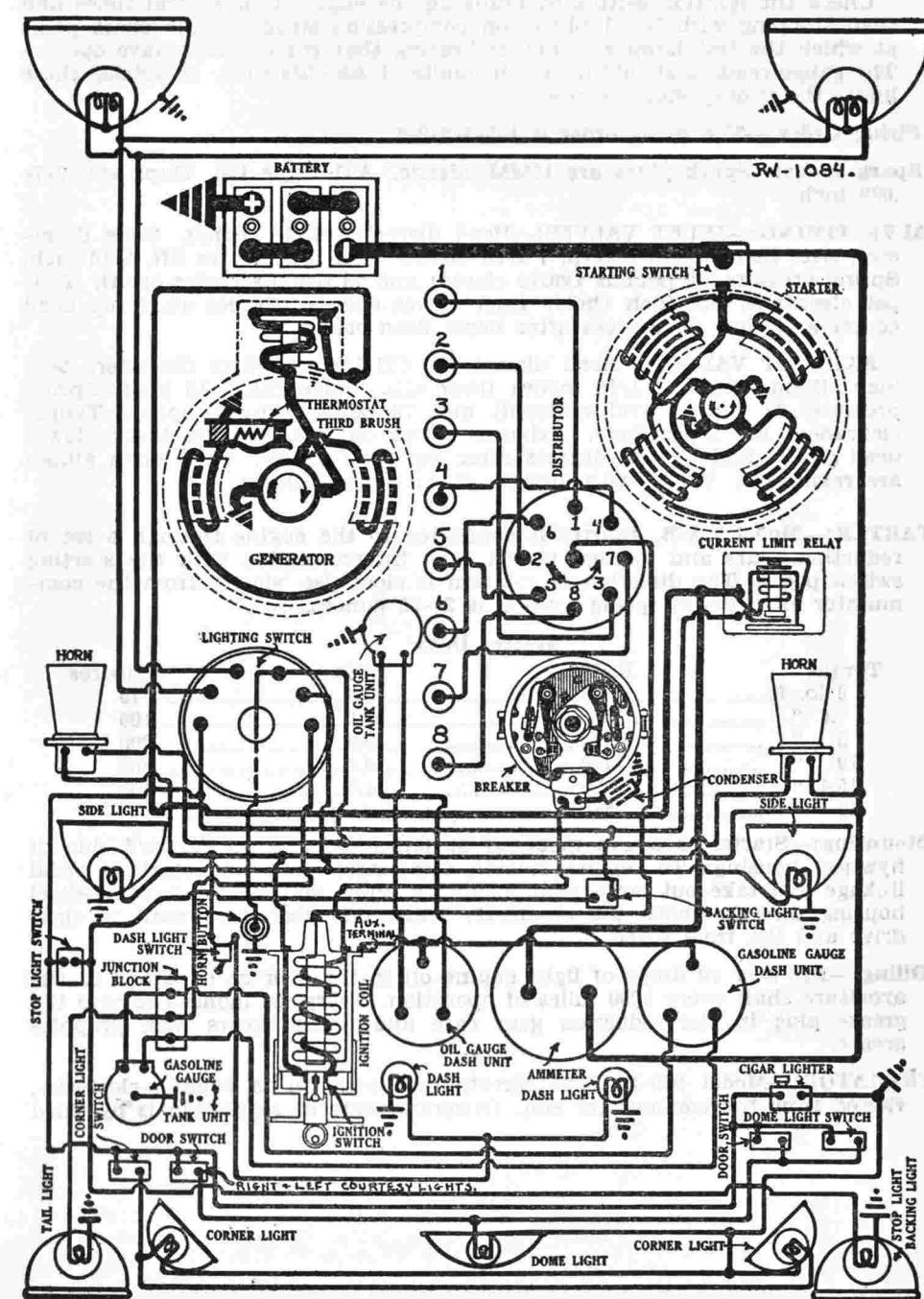
IGNITION:—Coil Model 526-V. Coil is mounted on the back of the instrument board with the ignition switch (which is built in the base of the coil) extending through to the face of the instrument panel. An extra terminal is located on the end of the coil from which the feed for the gasoline and oil gauge is taken. Ignition current is .6-3.0 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 658-W. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 13-17 degrees reached at 3600 R.P.M. Distributor has two sets of contacts on a four sided cam. Contacts separate alternately at intervals of 45 degrees corresponding to the firing interval of 90 degrees on the engine crankshaft. Contacts must be synchronized for correct ignition performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual control rod and primary lead and take off distributor head with cables intact. Then remove hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every month or each 1000 miles of operation. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft and place a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (top dead center entering power stroke). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.



CORD

FRONT WHEEL DRIVE MODEL L-29 (1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 3 teeth on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the engine is hand cranked in the usual way through an opening in the differential case at the front of the engine. The hand crank engages the crankshaft through an idler shaft and spur gear so that the crank should be turned clockwise in the usual way). Fully advance spark control lever. Continue to crank engine over until a point on the flywheel 3 teeth before the top dead center mark '1-8DC' is directly opposite the indicator in the inspection hole in the flywheel case. The crankshaft rotates in the opposite direction from an ordinary engine which reverses the position of the mark on the flywheel. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the plug in cylinder No. 1.

The proper ignition setting is determined by setting breaker contacts to open at top dead center with the manual spark control fully advanced and then rotating distributor clockwise to advance spark until a slight 'ping' or spark knock is noticed throughout the speed range of the car.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4. No. 1 cylinder nearest the radiator.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .030 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 $\frac{1}{2}$ inches. Stem diameter, .341-.3425 inch. Stem length, 4 $\frac{1}{8}$ inches. Valve lift, 11/32 inch. Tappet clearance, .006 inch (hot). Spring pressure, 45.5 pounds (valve closed). Inlet valves open at top dead center and close 45 degrees after lower dead center. The flywheel is marked '1-8DC' at point of inlet opening. Degrees on the flywheel can be changed into number of teeth before or after dead center by dividing the number of degrees by 3.22.

EXHAUST VALVES:—Head diameter, 1 15/32 inches. Stem diameter, .341-.3425 inch. Stem length, 4 $\frac{1}{8}$ inches. Valve lift, 11/32 inch. Tappet clearance, .008 inch (hot). Spring pressure, 45.5 pounds (valve closed). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made.

STARTER:—Model 724-N. Starter is connected to the engine through reduction gears and a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starting switch is Delco-Remy Part No. 821627.

Starter Data

Torque	R.P.M.	Volts	Ampères
0 lb. ft.....	3500.....	5.....	70.....
22 "	Lock.....	3.....	600.....

Mounting:—Starter is flange mounted at right of engine on rear of flywheel case. To remove starter, disconnect engine ventilator pipe and starter cable and take out three flange mounting cap screws. Then pull starter to the rear to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the armature shaft every month or each 1000 miles of operation. Every six months remove the grease plug in the reduction gear case and repack gears with graphite grease.

GENERATOR:—Model 941-T. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 19-21 amperes at 8.5 volts reached at 1450 R.P.M.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
7	7-7.3	750	11-14
19-21	8.3-8.5	1800	7.35-7.65

Shunt field current is 4-5.2 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

NOTE:—Generator Model 957-J superseded Model 941-T after the first 2000 cars. The performance data is identical with the first type.

Mounting:—Generator is base mounted at left of engine and is driven by accessory shaft from the chain case. To remove generator, disconnect lead and two screws in flexible drive coupling. Then take out four screws in base and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles of operation.

RELAY:—Model 265-F. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. when the generator voltage reaches 6.8-7.3 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Soreng Manegold Switch Model 5650-A. Switch is mounted at the base of the steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Tail light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and dome lights are 6-8 volt, 3 cp. S.C. Mazda 63. Corner lights are 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits to protect them from overload and short-circuits. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

DE SOTO EIGHT

MODEL CF (1930) SERIAL NUMBERS L001WP UP
 PRODUCTION STARTED DECEMBER 17, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 526-N. The ignition switch is built in the base of the coil. Coil is mounted on the back of the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5-2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

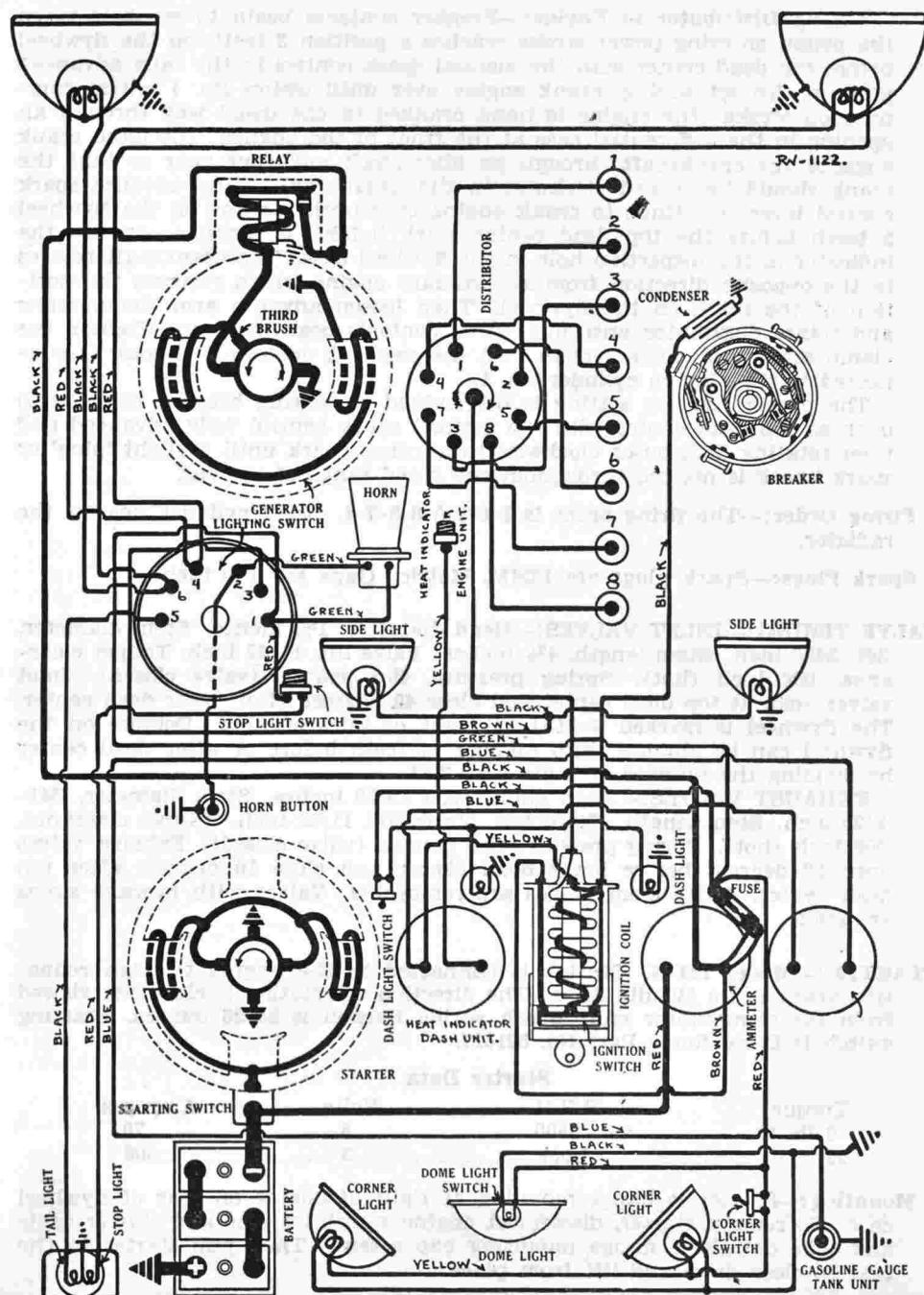
Distributor Model 660-D. Breaker contacts separate .018-.023 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. There are two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 2400 R.P.M. of engine. On Red Head engines the maximum automatic advance is 13.5 degrees reached at 2600 R.P.M.

Mounting:—Distributor is mounted at right of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

Timing: Synchronization of Contacts. To synchronize contacts, use special Delco-Remy tool, Part No. 820738, and follow directions in Equipment Section. It will not be possible to synchronize contacts without the special tool since no provision has been made to time the engine on any other cylinder than No. 8.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position .037 inch before top dead center with the spark control in the fully advanced position. To set timing, first remove the $\frac{1}{8}$ inch pipe plug in the cylinder head directly above No. 8 piston and screw the special micrometer gauge in place in the hole. Set breaker contact gap at .020 inch. Connect a six volt test lamp in series with the primary circuit by connecting one test lamp lead to the primary terminal on the distributor and the other lead to the relay terminal on the generator (if the battery is in the car). The lamp will remain lighted while the contacts are closed and will go out as soon as the contacts open. Fully advance spark control lever. Crank engine over until piston No. 8 reaches top dead center and set micrometer gauge at zero. Turn engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed) and stop when the micrometer gauge reads .037 inch before top dead center. Then loosen advance arm clamp screw and rotate distributor until the lamp goes out, indicating that the contacts have begun to open. Tighten the clamp screw and check rotor to see that it is directly opposite No. 1 segment in the distributor head (see diagram). Check timing



DE SOTO EIGHT

MODEL CF (1930) SERIAL NUMBERS L001WP UP
 PRODUCTION STARTED DECEMBER 17, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

by cranking engine over several times and then stopping with piston No. 1 on compression stroke at the exact instant the lamp goes out, indicating the firing position of piston No. 1. If the gauge reading is within the limits of .032-.042 inch, the setting is satisfactory. If gauge reading is outside these limits the engine must be retimed.

Special Note for Red Head Engines. Timing directions as given above apply on all Model CF engines with standard compression 5.2-1 heads. The procedure for timing engines equipped with the high compression (6.2-1) Red Heads is similar except that contacts separate with the piston .040 inch before top dead center and the limits are .035-.045 inch.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .027-.030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.407 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches (from top of taper). Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 4 degrees before top dead center and close 36 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.407 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches. Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 52 degrees before lower dead center and close 2 degrees before top dead center. Valve stem guides are removable.

STARTER:—Model 714-Q. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal linkage. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800	5.6	80
.4 "	3250	5.5	100
3 "	1500	5.0	200
6 "	800	4.5	300
9.4 "	350	4.0	400
13.0 "	Lock	3.5	500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 943-L. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third

brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	760	0	6.4	850
6	7.0	1000	6	7.0	1200
10	7.4	1200	10	7.4	1600
16	8.0	2100	12.5	7.7	2300
12	7.7	3200	10	7.5	3200

Motoring, generator draws 3 amperes at 6 volts. Shunt field current is 4-5.9 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on special hinge bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then remove two bolts holding generator on bracket and lift generator from place.

Belt Adjustment. The fan belt tension is adjusted by swinging the generator away from the engine. To make the adjustment, loosen the two bolts under the generator. Then loosen adjustment clamp bolt and pull generator out from the engine until the proper belt tension is secured. Tighten the clamp bolt and the mounting bolts. The belt tension should be just sufficient to drive the fan and generator without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Model 265-G. Relay is mounted on the generator. Relay contacts close at 750 R.P.M. when the generator voltage reaches 6.4-7 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted back of the ammeter is 20 ampere capacity.

DODGE SIX

MODEL DD (1930) SERIAL NUMBERS 0001WP UP
 PRODUCTION STARTED DECEMBER 13, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-13, 6 volt, 100 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 526-L. The ignition switch is built in the base of the coil. Coil is mounted on the rear of the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 632-D. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 13-15 degrees (engine) reached at 2000 R.P.M.

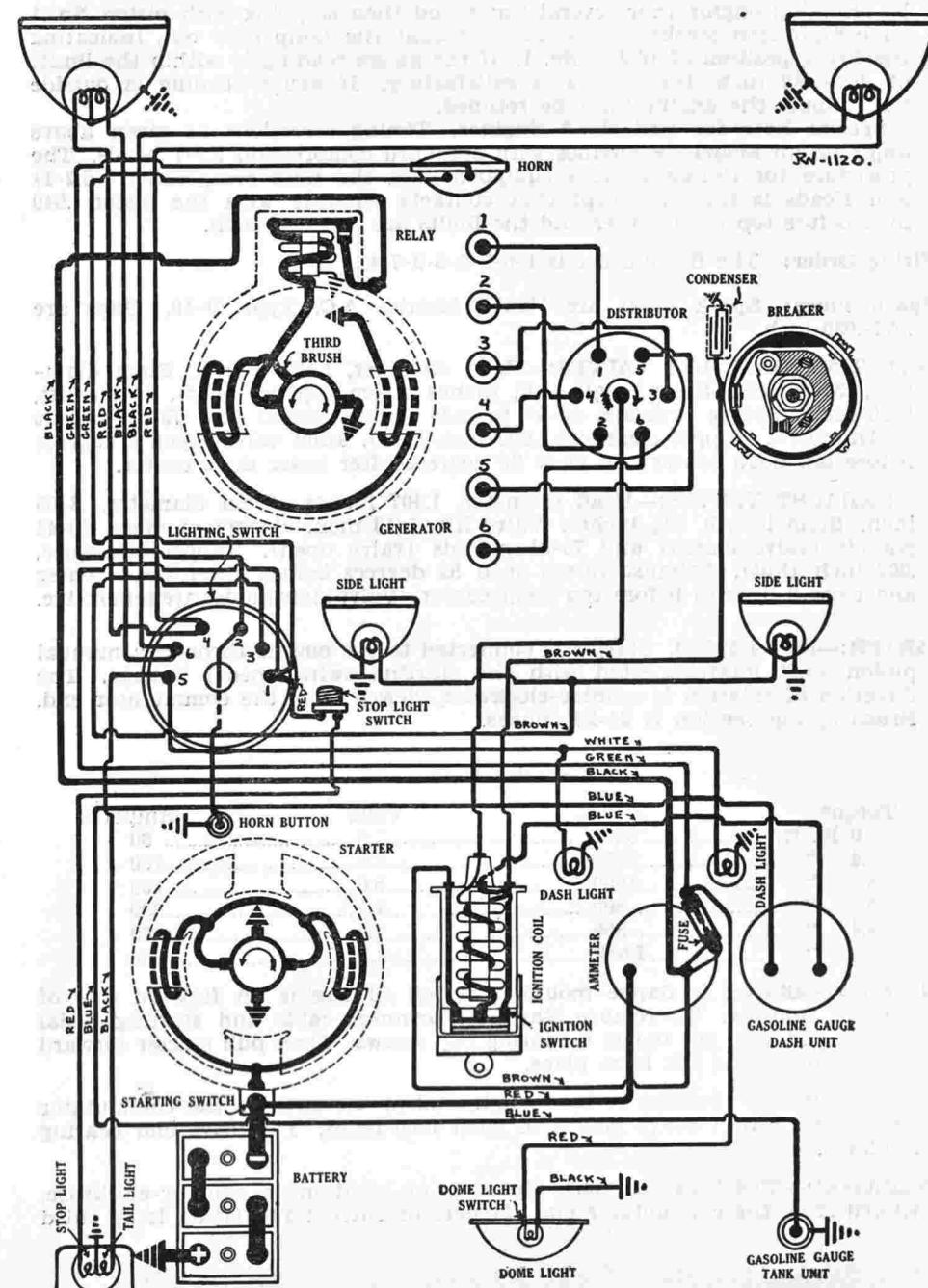
Mounting:—Distributor is mounted at the right of the engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out hold-down screw at rear of advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position .009 inch before top dead center with the spark control lever in the fully advanced position. To set timing, first set breaker contact gap at .020 inch. Fully advance spark control lever. Then remove the $\frac{1}{8}$ inch pipe plug from the cylinder head directly above No. 6 cylinder and screw the special timing micrometer gauge in place in the hole. Connect a small six volt lamp in the primary circuit (this can be done by connecting one lamp lead to the primary terminal of the distributor and the other lamp lead to the relay terminal of the generator. If the battery is out of the car, connect the lamp lead to a battery and ground the other battery terminal to the engine). Turn engine over and set micrometer at zero on top dead center. Crank the engine over until piston No. 1 is coming up on compression stroke (both valves will be closed) and stop when the gauge indicates that the piston is .009 inch before top dead center. Remove distributor head and see that rotor is opposite No. 1 segment (see diagram). Loosen the advance arm clamp screw and rotate the distributor until the contacts begin to open, when the lamp will go out. Tighten the clamp screw and connect the spark plug leads in order 1-5-3-6-2-4 clockwise around the distributor head. Check the setting by cranking the engine over several times and then stopping with piston No. 1 on compression stroke at the point where the lamp goes out, indicating that the contacts have begun to open. If the gauge reading is within .004-.014 inch before top dead center, the setting is satisfactory. If outside these limits the engine should be retimed.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are



DODGE SIX

MODEL DD (1930) SERIAL NUMBERS 0001WP UP
 PRODUCTION STARTED DECEMBER 13, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

VALVE TIMING:—INLET VALVES.—Head diameter, 1.469 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches (from top of taper). Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 6 degrees after top dead center and close 46 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.469 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches (from top of taper). Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable.

STARTER:—Model 714-Q. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal linkage. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800	5.6	.80
.4 "	3250	5.5	.100
3 "	1500	5.0	.200
6 "	800	4.5	.300
9.4 "	350	4.0	.400
13.0 "	Lock	3.5	.500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch pedal linkage and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 943-L. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.



Generator Data			
Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
0	6.4	760	0
6	7.0	1000	6
10	7.4	1200	10
16	8.0	2100	12.5
12	7.7	3200	10

Motoring, generator draws 3 amperes at 6 volts. Shunt field current is 4-5.9 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on special hinge bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then remove two bolts holding generator on bracket and lift generator from place.

Belt Adjustment. The fan belt tension is adjusted by swinging the generator away from the engine. To make the adjustment, loosen the two bolts under the generator. Then loosen adjustment clamp bolt and pull generator out from the engine until the proper belt tension is secured. Tighten the clamp bolt and the mounting bolts. The belt tension should be just sufficient to drive the fan and generator without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Model 265-G. Relay is mounted on the generator. Relay contacts close at 750 R.P.M. when the generator voltage reaches 6.4-7 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted back of the ammeter is 20 ampere capacity.

DODGE EIGHT

MODEL DC (1930) SERIAL NUMBERS E001WP UP
 PRODUCTION STARTED DECEMBER 13, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 526-M. The ignition switch is built in the base of the coil. Coil is mounted on the back of the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

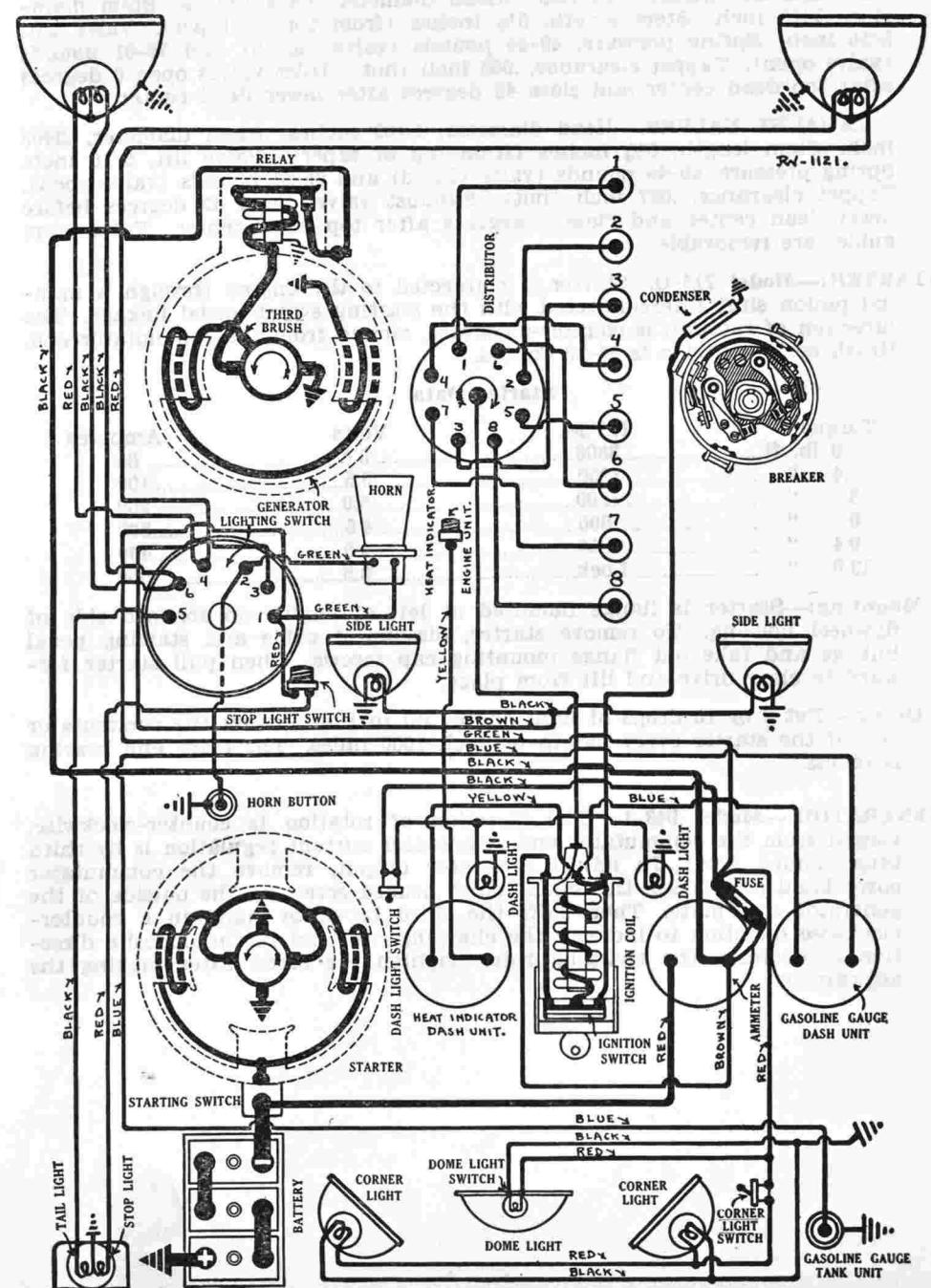
Distributor Model 660-B. Breaker contacts separate .018-.023 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. There are two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This interval must be accurately set by synchronizing the contacts for satisfactory performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 11.5 degrees reached at 2600 R.P.M.

Mounting:—Distributor is mounted at right of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and manual advance control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every month or each 1000 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** To synchronize contacts use special Delco-Remy tool, Part No. 820738, and follow directions given in the Equipment Section under 'Delco-Remy Distributors.' It will not be possible in this case to synchronize the contacts without this tool as no provision is made to time the engine on any other cylinder than No. 8.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position .040 inch before top dead center with the manual spark control fully advanced. To set timing, first take out the pipe plug in the cylinder head directly above No. 8 piston and screw the special micrometer gauge in this hole. Set breaker contact gap at .020 inch. Connect a six volt test lamp in the primary circuit to accurately determine the point at which contacts open. This can be done by connecting one test lamp lead to the primary terminal of the distributor and connecting the other lead to the relay terminal of the generator if the battery is in the car. Place spark control lever in the fully advanced position. Crank engine over until piston No. 8 is at top dead center and set micrometer gauge at zero. Then crank engine until piston No. 1 enters compression stroke (the up stroke with both valves closed). Turn engine over until the gauge reads .040 inch indicating that piston No. 1 is .040 inch before top dead center. Then loosen the advance arm clamp screw and rotate the distributor until the lamp goes out, indicating that the contacts have opened. Tighten the clamp screw and check the rotor to see that it is directly opposite the segment connected to the spark plug in cylinder No. 1.



DODGE EIGHT

MODEL DC (1930) SERIAL NUMBERS E001WP UP
 PRODUCTION STARTED DECEMBER 13, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

then stop with piston No. 1 on compression stroke at the point at which the lamp goes out, indicating that the contacts are beginning to open. If the gauge reading is within limits of .035-.045 inch the ignition setting is satisfactory. If outside these limits the engine should be retimed. Connect the spark plug wires in order 1-6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. A.C. Type G-10. Gaps are .027-.030 inch.

VALVE TIMING:—**INLET VALVES.** Head diameter, 1.407 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches (from top of taper). Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .005 inch (hot). Inlet valves open 4 degrees before top dead center and close 36 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.407 inches. Stem diameter, .3405 inch. Stem length, 5 $\frac{1}{4}$ inches. Valve lift, 5/16 inch. Spring pressure, 40-44 pounds (valve closed) and 75-81 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 52 degrees before lower dead center and close 2 degrees before top dead center. Valve stem guides are removable.

STARTER:—**Model 714-Q.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch pedal linkage. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3800	5.6	.80
.4 "	3250	5.5	.100
3 "	1500	5.0	.200
6 "	800	4.5	.300
9.4 "	350	4.0	.400
13.0 "	Lock	3.5	.500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—**Model 943-L.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the

generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	760	0	6.4	850
6	7.0	1000	6	7.0	1200
10	7.4	1200	10	7.4	1600
16	8.0	2100	12.5	7.7	2300
12	7.7	3200	10	7.5	3200

Motoring, generator draws 3 amperes at 6 volts. Shunt field current is 4-5.9 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on special hinge bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then remove two bolts holding generator on bracket and lift generator from place.

Belt Adjustment. The fan belt tension is adjusted by swinging the generator away from the engine. To make the adjustment, loosen the two bolts under the generator. Then loosen adjustment clamp bolt and pull generator out from the engine until the proper belt tension is secured. Tighten the clamp bolt and the mounting bolts. The belt tension should be just sufficient to drive the fan and generator without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—**Model 265-G.** Relay is mounted on the generator. Relay contacts close at 750 R.P.M. when the generator voltage reaches 6.4-7 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—**Clum Switch Model 8821.** Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse mounted back of the ammeter is 20 ampere capacity.

DUESENBERG

(1929-30)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXRV-21-2G, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 164 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 30 hours. Battery is mounted on the right frame member under the dust shield.

IGNITION:—Coil Model 553-A, B (2 coil unit). The ignition switch is built in the base of the coils. The coil unit is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel.

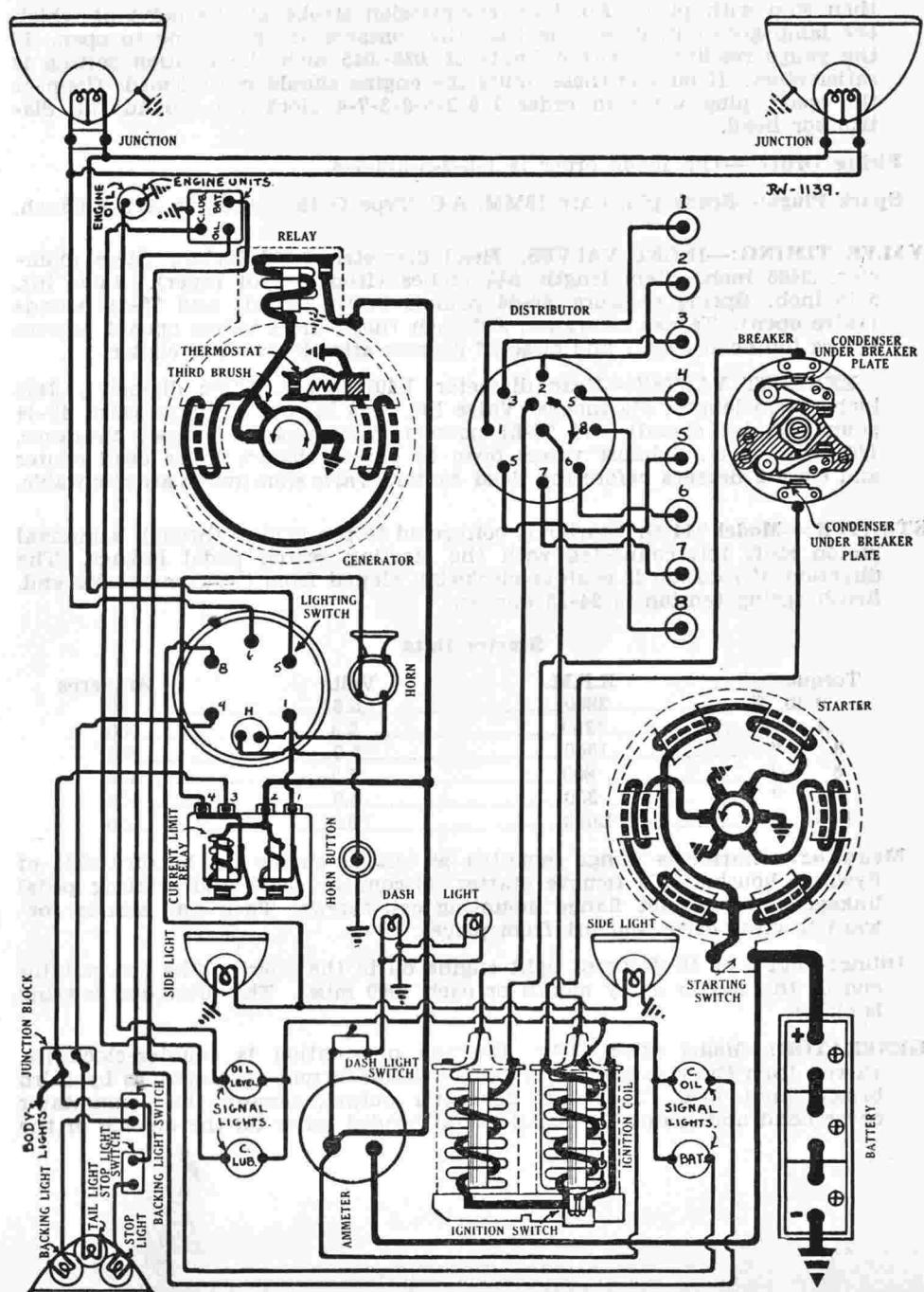
Distributor Model 4044 (SM1064) Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until breaker gap is .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 700 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2000 R.P.M. of engine. Breaker has two sets of contacts operating on a single four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on a bracket directly above the center of the left hand overhead camshaft on the top of the engine and is driven through spiral gears from the camshaft. The manual spark control operates through gears hidden in the base mounting flange. To remove distributor, disconnect primary leads and remove distributor head with cables intact. Then take out four mounting screws in distributor base mounting flange and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 1000 miles of operation. At the same time remove the distributor head and rotor and put 4 or 5 drops of oil on top of the cam locking screw in the center of the shaft and 1 or 2 drops of oil on the breaker arm pivot pins. Put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** The second set of contacts mounted on movable sub-plate begin to open exactly 45 degrees after the first set mounted directly on the breaker plate. Synchronize contacts on a rotary spark gap or turn engine over exactly 90 degrees from firing position of piston No. 1 after distributor has been timed to the engine when piston No. 6 will reach firing position (6 degrees after top dead center with manual spark control retarded). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until contacts open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 6 degrees on the flywheel after top dead center with the manual spark control fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark control lever and turn engine over until the ignition mark on the flywheel, which is 6 degrees



DUESENBERG

(1929-30)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

after the top dead center mark ' $\frac{1}{8}$ ' is directly opposite the reference line on the flywheel housing. Then loosen lock screw in center of breaker cam and carefully locate cam so that the first set of contacts are beginning to open. Tighten the screw and see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 $\frac{1}{2}$ inches. Stem diameter, 11/32 inch. Stem length, 5 $\frac{1}{8}$ inches. Valve lift, .350 inch. Spring pressure, 65 pounds (valve closed) 105 pounds (valve open). Tappet clearance, .025 inch. Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches. Stem diameter, 11/32 inch. Stem length, 5 $\frac{1}{8}$ inches. Valve lift, .350 inch. Spring pressure, 65 pounds (valve closed) 105 pounds (valve open). Tappet clearance, .025 inch. Exhaust valves open 40 degrees before lower dead center and close 14 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

NOTE:—This engine has two inlet valves and two exhaust valves per cylinder. The exhaust valves are located in the cylinder head at the right of the engine and are operated directly by the right overhead camshaft. The inlet valves are at the left of the cylinder head and are operated by the left hand overhead camshaft. Both camshafts are chain driven from a transfer sprocket on the front of the engine block. The transfer sprocket is chain driven from the crankshaft.

STARTER:—Model 429. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 36-40 ounces. The starting switch is mounted on the starter field frame.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3000.....	5.....	70.....
19 ".....	Lock.....	3.....	500.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect starting switch control wire and cables and take out three flange mounting bolts. Then pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model 428. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the commutator cover band and shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in any position by friction.

Generator Data			
Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
19-21.....	8.3-8.7.....	1200.....	11-13.....
Shunt field current is 3.2-4.1 amperes at 6 volts. Brush spring tension is 20-24 ounces. Generator motoring draws 4.5 amperes at 6 volts.			

Mounting:—Generator is cradle mounted at left of engine and is driven by the accessory drive shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 1000 miles of operation.

RELAY:—Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-D. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda 1129.

CURRENT LIMIT RELAY:—Model 5759. This device consists of a vibrating and lock-out circuit breaker mounted on the left side of the dash. The vibrating circuit breaker is connected in the lighting circuits to protect them from overload and short-circuits. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 5-15 amperes. The lock-out circuit breaker connected in the horn and stop light circuits begins to operate when the current reaches 25-30 amperes and continues limiting the current to less than 1 ampere. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed. Spring tension at plunger is 5 ounces (minimum).

DURANT
MODEL 6-14 (1930)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on right frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4082. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. The engine temperature indicator, gasoline gauge and stop light are connected to an auxiliary terminal on the side of the coil.

Distributor Model IGB-4031. Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 24 degrees (engine) reached at 2400 R.P.M.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect manual spark control and primary lead and remove distributor head with cables intact. Then take off nut on hold-down stud in advance arm and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor head every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

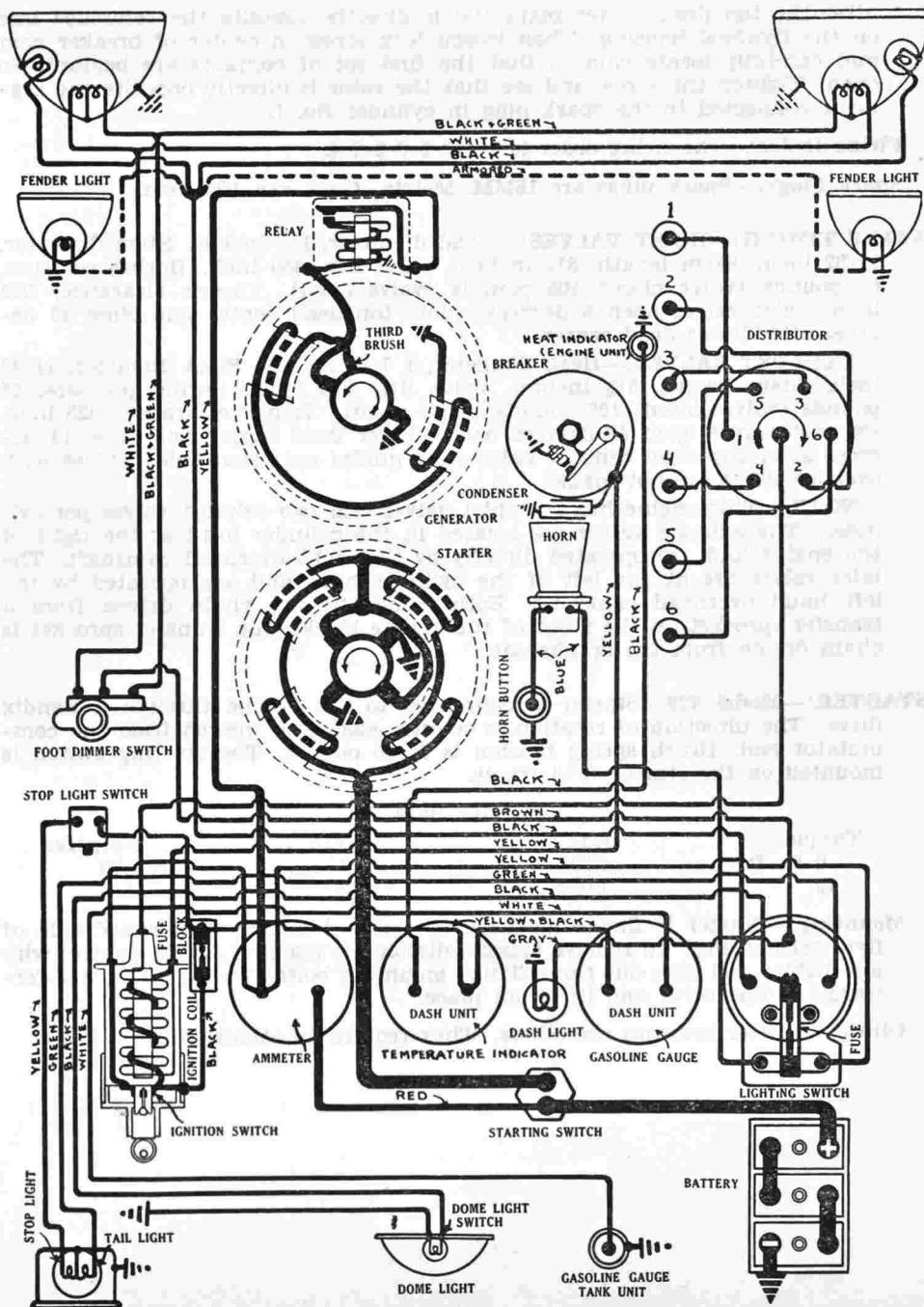
Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position 6 degrees or two teeth on the flywheel before top dead center with the spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and see that distributor is rotated counter-clockwise as far as possible. Turn engine over until a point on the flywheel two teeth before the top dead center mark is directly opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the segment directly opposite the rotor in the distributor head is connected to the spark plug in cylinder No. 1. Spark plug connections are shown on the diagram.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, 11/32 inch. Stem length, 5 9/32 inches. Valve lift, 5/16 inch. Spring pressure, 45 pounds (valve closed) 80 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches. Stem diameter, 11/32 inch. Stem length, 5 9/32 inches. Valve lift, 5/16 inch. Spring pressure, 45 pounds (valve closed) 80 pounds (valve open). Tappet clearance, .008 inch



DURANT
MODEL 6-14 (1930)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

(hot). Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Tappet clearance should be set at .012 inch in checking valve timing.

STARTER:—Model MAJ-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 1 $\frac{3}{4}$ -2 $\frac{1}{4}$ pounds. Starter switch is Model SW-4003.

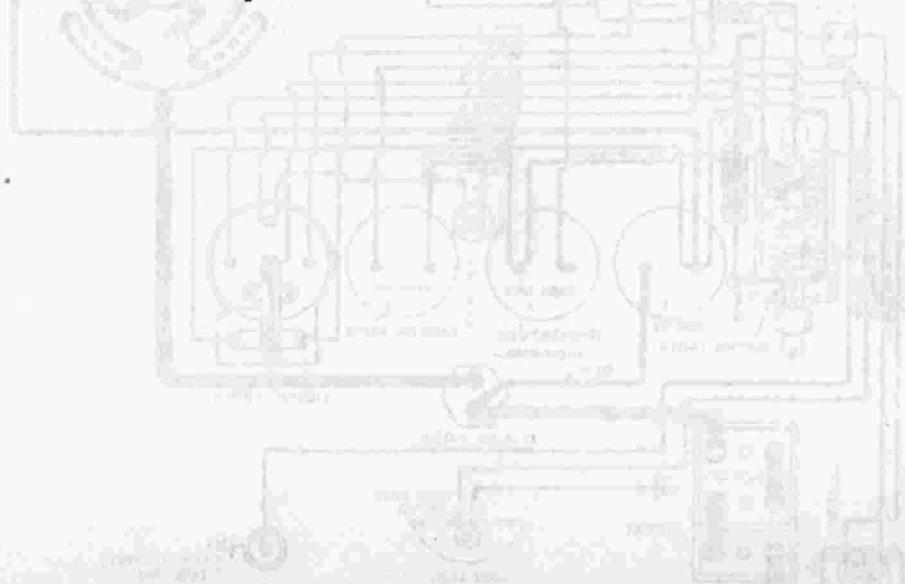
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3000-5000	.6	50
3 "	1350	.5	200
5.5 "	900	4.5.....	300
13.5 "	Lock	3	550

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and take off flange mounting screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles of operation.

GENERATOR:—Model GAL-4130. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 16-17 amperes at 8 volts reached at 1900 R.P.M. or 24 miles per hour.



Generator Data		
Amperes	Volts	R.P.M.
0.....	6.2.....	600
8.....	7.1.....	900
17.....	8.0.....	1900
12.....	7.7.....	3200

Shunt field current is 4.5 amperes at 6 volts. Generator motoring draws 4.75 amperes at 6 volts. Brush spring tension is 24-32 ounces.

Mounting:—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump drive coupling and slip off drive belt. Then loosen mounting clamp band and slip generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every week or each 500 miles of operation.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Lighting Switch Model 5192. Dimmer Switch Model 8871. Lighting switch is mounted on the instrument board. Headlights are double-filament using a second 21 cp. filament controlled by a switch mounted on the toeboard instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking bulbs (in headlights) or fender lights (used as special equipment) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament.

FUSES:—Lighting fuse mounted on switch is 20 ampere capacity. A separate fuse is mounted on the dash and connected in the auxiliary lead from the coil.

DURANT
MODEL 6-17 (1930)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4082. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. There is an auxiliary terminal on the side of the coil to which the stop light, temperature indicator and gasoline gauge feed wires are connected.

Distributor Model IGB-4036-A. Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until gap is .020 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 30 degrees (engine) reached at 1400 R.P.M.

Mounting:—Distributor is mounted on the commutator end of the generator at the right of the engine. To remove distributor, disconnect spark control wire and primary lead and remove distributor head with cables intact. Then take out hold-down screw and lift distributor from place.

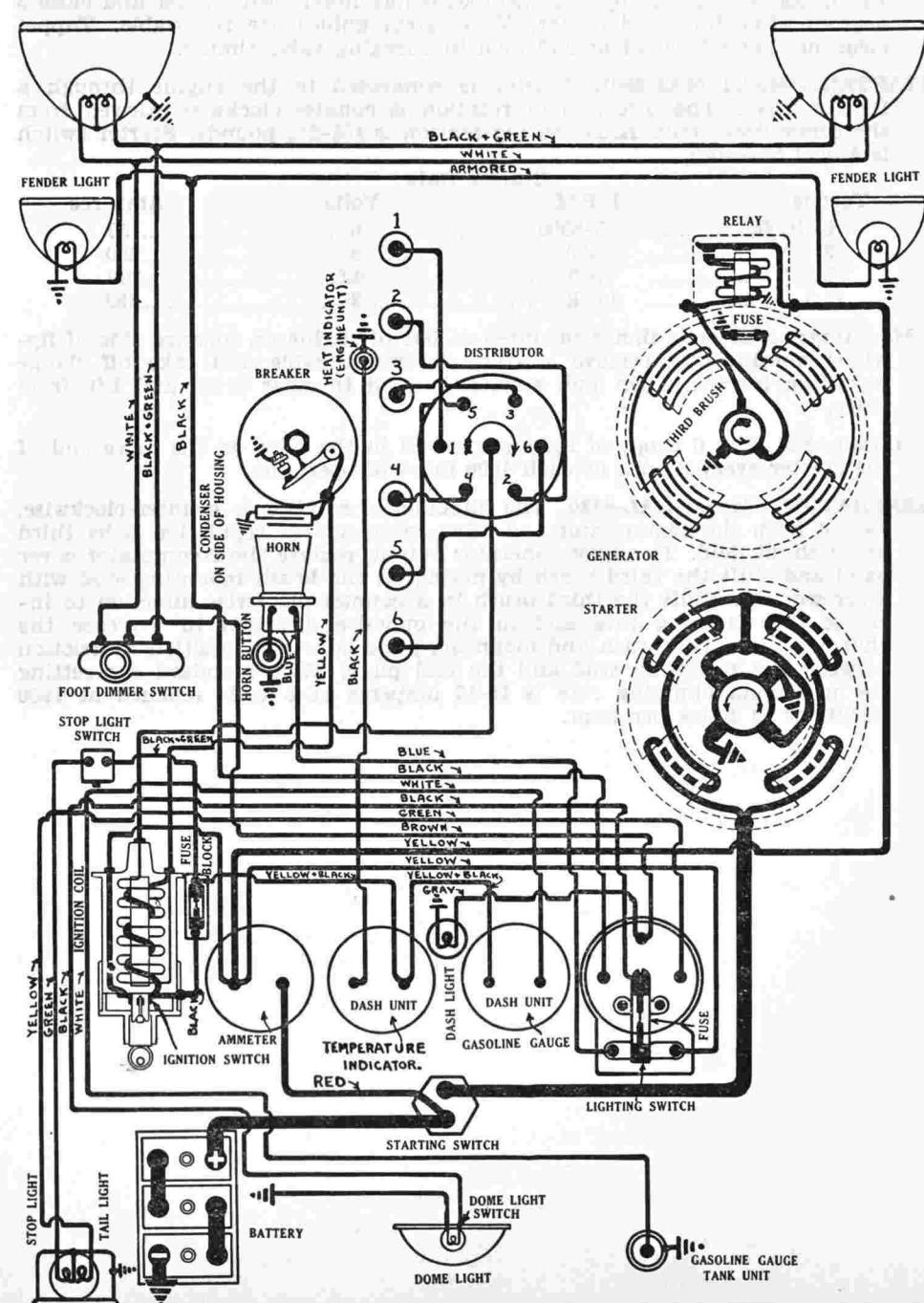
Oiling:—Put 5 or 6 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $6\frac{1}{2}$ degrees or one inch on the flywheel before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control and see that distributor is rotated counter-clockwise to the full limit of the advance arm slot. Turn engine over until a point on the flywheel one inch or approximately two teeth before the top dead center mark for cylinder No. 1 is directly opposite the indicator in the inspection hole in the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Spark plug connections are shown on the diagram.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $15\frac{1}{8}$ inches. Stem diameter, .371 inch. Stem length, $5\frac{45}{64}$ inches. Valve lift, $5\frac{1}{16}$ inch. Spring pressure, 57 pounds (valve closed) 103 pounds (valve open). Tappet clearance, .006 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.



DURANT

MODEL 6-17 (1930)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

EXHAUST VALVES:—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, .371 inch. Stem length, $5\frac{45}{64}$ inches. Valve lift, $\frac{5}{16}$ inch. Spring pressure, 57 pounds (valve closed) 103 pounds (valve open). Tappet clearance, .006 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Valves with over-size stems are not made. Tappet clearance should be set at .012 inch in checking valve timing.

STARTER:—Model MAD-4101. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is $1\frac{3}{4}$ - $2\frac{1}{4}$ pounds. Starter switch is Model SW-4001.

Starter Data

Torque	R.P.M.	Volts	Amperes
.3 lb. ft.	2500	5.5	100
2.7 "	1350	5.0	200
5.3 "	815	4.5	300
8.5 "	425	4.0	400
15 "	Lock	3.6	750

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out three flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAK-4103. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush plate mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16 amperes at 8 volts reached at 1550 R.P.M. or 23 miles per hour.



Generator Data		
Amperes	Volts	R.P.M.
2	6.6	560
6	6.9	675
10	7.3	875
14	7.65	1000
16.8	8.0	1525
14	7.65	2025

Shunt field current is 4.5 amperes at 6 volts. A 7.5 ampere field fuse is connected in the field circuit. Generator motoring draws 6 amperes at 6 volts. Brush spring tension is 24-32 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then take off chain inspection cover on front of chain case and remove nut on generator shaft holding drive sprocket in place. Remove flange mounting cap screws and pull generator to the rear, leaving the sprocket in the chain case. Tie up the timing chain and do not turn engine over with generator out.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every week or each 250 miles. Every 5000 miles remove the oil well and clean out old oil and grease. Refill with light oil. The drive end bearing is oiled from the chain case.

RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close at 550 R.P.M. or 11 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 5192. Dimmer Switch Model 8871. Lighting switch is mounted on the instrument board. Headlights are equipped with double filament bulbs controlled by a dimmer switch mounted on the toe-board. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail light is 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament.

FUSES:—Generator field fuse is 7.5 ampere capacity. Lighting fuse mounted on switch is 20 ampere capacity. There is a fuse mounted on the dash connected in the auxiliary circuit from the coil.

ELCAR
MODEL 6-75 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DEL-CO-REMY IGNITION

BATTERY:—U.S.L. XY-13-X-6, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the dash. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Distributor Model 631-E. Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 30 degrees reached at 2800 R.P.M. A Shaler ignition switch is standard equipment.

Mounting:—Distributor is mounted on the cylinder head. The Shaler lock switch must be disconnected at the dash and removed with the distributor as a unit. The Shaler switch can then be removed from the distributor by taking off the nut on the terminal stud inside the distributor case and pulling the trap mechanism and stud out of the distributor case. To remove distributor, disconnect Shaler switch and manual advance rod and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down two turns every 1000 miles of operation. At the same time remove the distributor head and place a small bit of vaseline on the face of the breaker cam.

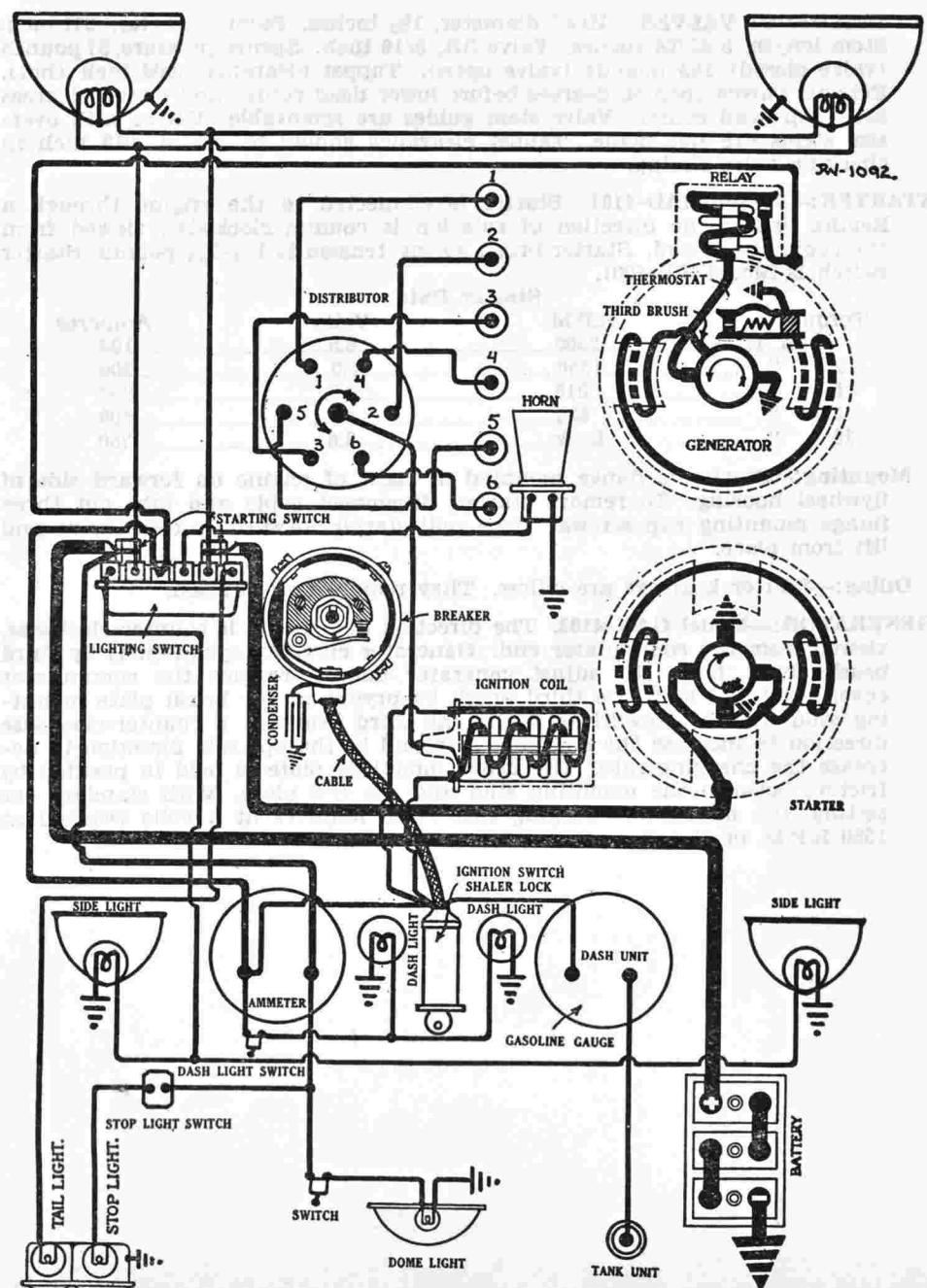
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 degrees (on the flywheel) after top dead center with the manual spark control in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark control. Continue to crank engine until the piston reaches firing position when the exhaust valve in cylinder No. 6 will just close. Loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, .341 inch. Stem length, 5 5/16 inches. Valve lift, 11/32 inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 35 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, .341 inch. Stem length, 5 5/16 inches. Valve lift, 11/32 inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable.



ELCAR
MODEL 6-75 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust charging rate, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes at 8 volts reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.65	1800-2000

Generator motoring, draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on a special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Then remove two bolts in the bracket under the generator and lift generator and water pump from place. The water pump can be removed by taking out the cap screws on the generator bosses.

Belt Adjustment:—To adjust belt tension, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not make the drive belt too tight or it will crowd the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Aid 'Finger Tip Control' Lighting Switch. Lighting switch is mounted at the lower end of the steering column. The starting switch, horn button and lighting switch are combined in one unit controlled by the lever on the steering wheel. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

ELCAR
MODELS 8-95, 8-96 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type 3-CVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the dash. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

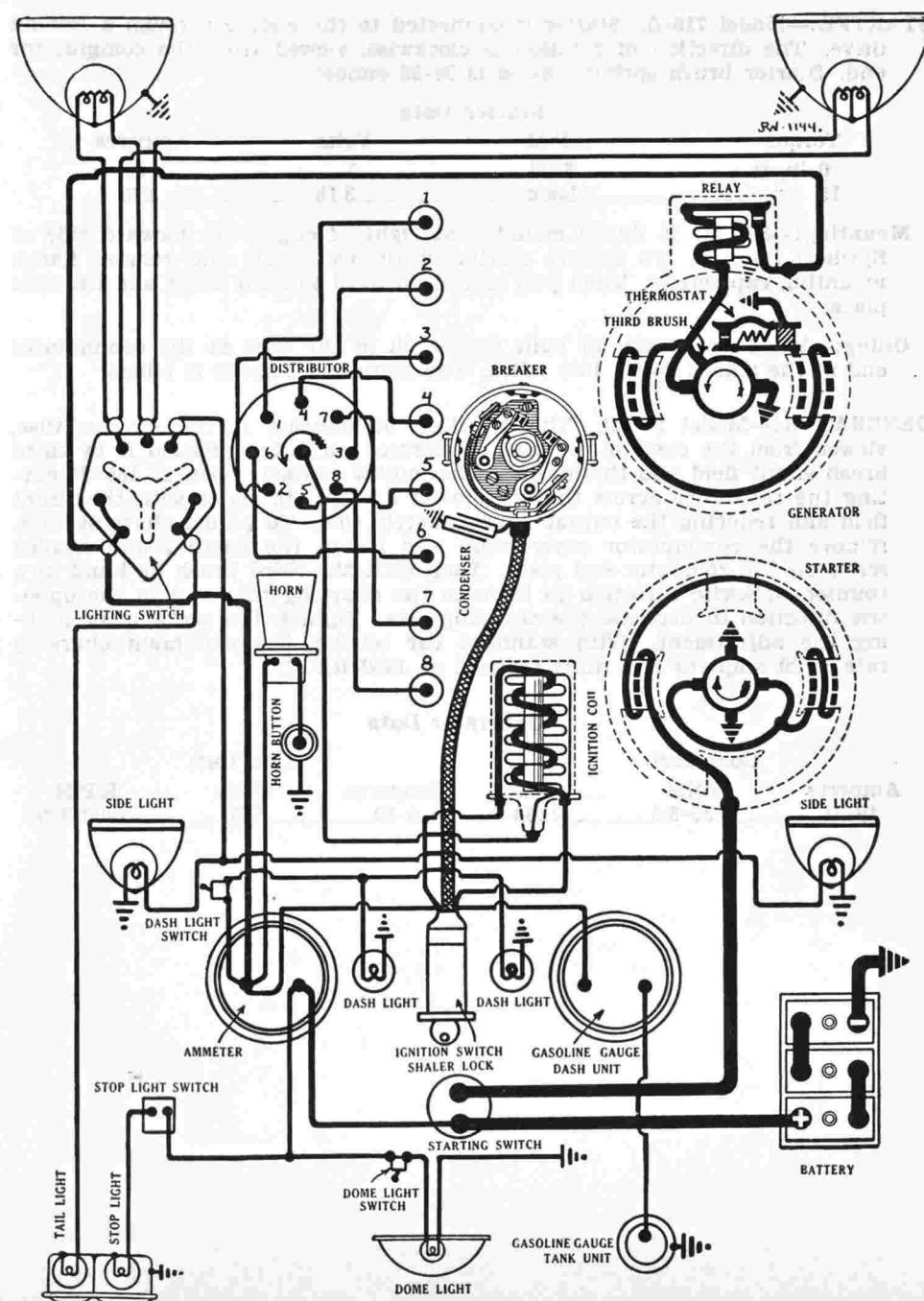
Distributor Model 651-C. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 300 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 1800 R.P.M. of engine. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees which corresponds to the 90 degree firing interval of the engine crankshaft. Contacts must be synchronized for correct ignition performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. The Shaler Lock, which is standard equipment, must be removed as a unit with the distributor whenever the distributor is taken off the car. To remove distributor, disconnect the Shaler lock at the dash, disconnect the manual spark control and take off the distributor head with the cable intact. Then take out the stop screw in the spark advance arm and lift the distributor from place. The Shaler lock can then be removed from the distributor by taking off the nut on the terminal stud inside the distributor case and withdrawing the trap mechanism and terminal stud from the distributor case.

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles. At the same time remove the distributor head and rotor and fill the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use a special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without use of tool after distributor has been timed to the engine by cranking engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. If the second set of contacts are not separating at this point, loosen the two lock screws on the movable breaker plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 5 degrees on the flywheel past top dead center with the manual spark control in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever and continue to crank engine until piston reaches firing position when a point on the flywheel approximately 3 teeth after the top dead center mark for cylinders 1 and 8 will be opposite the indicator in the inspection hole in the flywheel housing. Then loosen advance arm clamp screw and



ELCAR

MODELS 8-95, 8-96 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

rotate distributor until the contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:** Head diameter, 1 $\frac{17}{32}$ inches. Stem diameter, .341 inch. Stem length, 5 $\frac{5}{16}$ inches. Valve lift, 11/32 inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 35 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{13}{32}$ inches. Stem diameter, .341 inch. Stem length, 5 $\frac{5}{16}$ inch. Valve lift, 11/32 inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 42 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces. Starter switch is Model 406-A.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at the commutator end of the starter every 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust charging rate, remove the commutator cover band and loosen the small round headed

screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes at 8 volts reached at 1450 R.P.M. or 30 M.P.H.

Generator Data

Cold Test		Hot Test	
Ampères	Volts	R.P.M.	Ampères
19-21	8.35-8.5	1450	9-12

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted on a special swinging bracket at right of engine and is belt driven from the crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then loosen adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Then remove two bolts in the bracket under the generator and lift the generator and water pump from place. The water pump can be removed by taking out the cap screws on the generator bosses.

Belt Adjustment. To adjust belt tension, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not make the drive belt too tight or it will crowd the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts must not exceed 3 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 1303. Lighting switch is mounted at lower end of the steering column. Double filament headlights using a second 21 cp filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

ELCAR
MODELS 130, 140 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—U.S.L., Type 3-HVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 ampere for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23.4 hours.

IGNITION:—Coil Model 553-H. The Coil unit consists of two coils with the ignition switch built in the base of the unit. Coils are mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 4 amperes at 6 volts with engine running and 8 amperes at 6 volts with engine stopped.

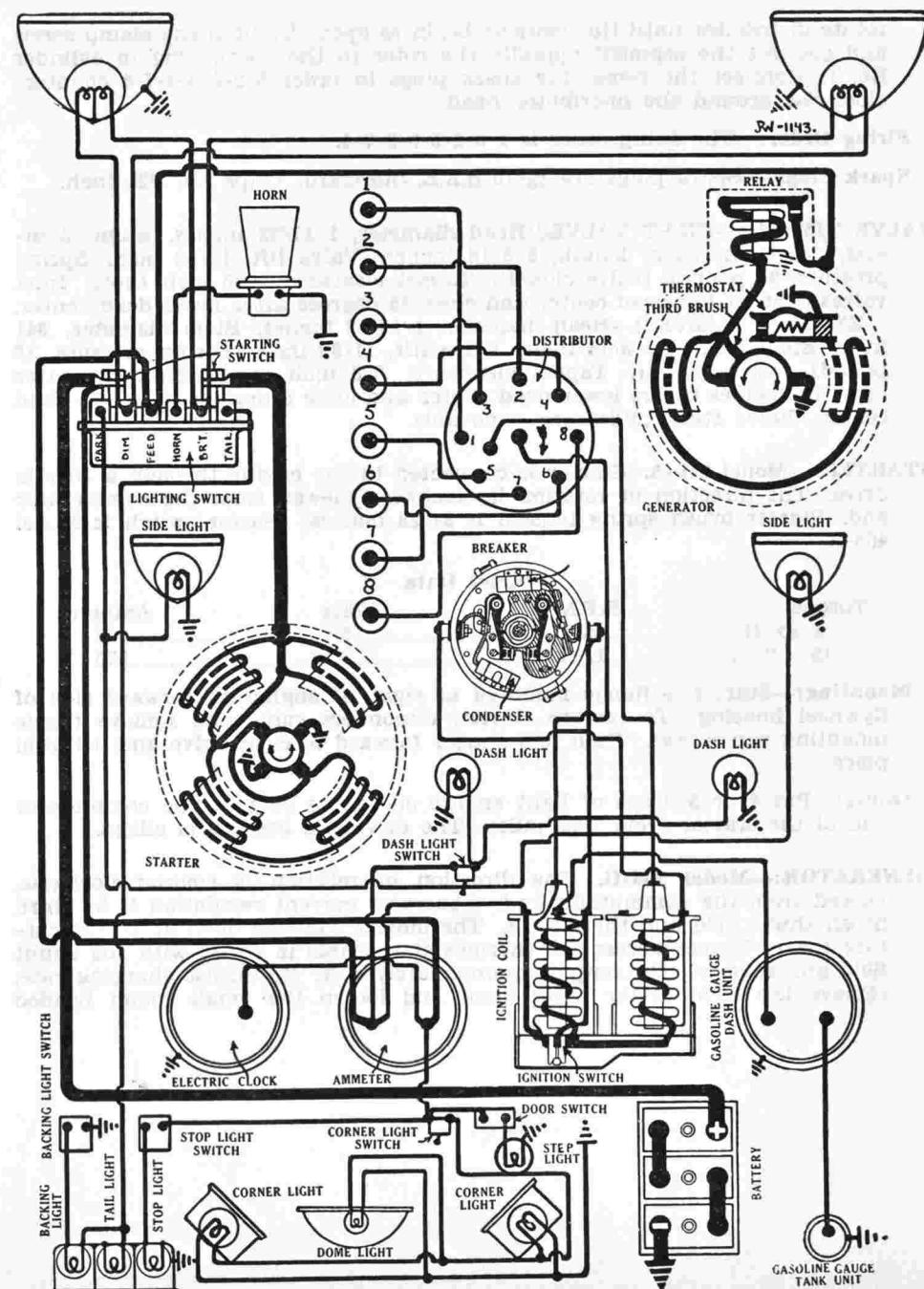
Distributor Model 668-H. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 2600 R.P.M. of engine. Breaker has two sets of contacts operating on a single four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the generator at the right of the engine. To remove distributor, disconnect the manual spark control and take off the distributor head with cables intact. Then take out the stop screw in the spark advance arm and lift the distributor from place.

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles. At the same time remove the distributor head and rotor and fill the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 1835009, and follow complete directions in Equipment Section. Contacts can be synchronized after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (3 teeth on flywheel past top dead center). If the second set of contacts do not open at this point, loosen the two lock screws and turn eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 5 degrees on the flywheel past top dead center with the manual spark control in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever and continue to crank engine until piston reaches firing position when a point on the flywheel approximately 3 teeth after the top dead center mark for cylinders 1 and 8 will be opposite the indicator in the inspection hole in the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and connect



ELCAR

MODELS 130, 140 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 3-2-4-8-6-7-5 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, .341 inch. Stem length, $5\frac{19}{32}$ inches. Valve lift, $11/32$ inch. Spring pressure, 44 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, $1\frac{15}{32}$ inches. Stem diameter, .341 inch. Stem length, $5\frac{9}{16}$ inches. Valve lift, $11/32$ inch. Spring pressure, 44 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable.

STARTER:—Model 725-G. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush tension should be 24-28 ounces. Starter switch is mounted at lower end of steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5.0	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at left of engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove 3 cap screws from flange. Lift starter forward and out.

Oiling:—Put 5 or 10 drops of light engine oil in the oiler on the starter every 1000 miles.

GENERATOR:—Model 945-U. The direction of rotation of the generator is counter-clockwise, viewed from the commutator end. Current regulation is by the third brush system, combined with a thermostat. The thermostat con-

tacts open at 150°F . To adjust the generator output, loosen the screw in generator end plate and shift the third brush mounting plate in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
19-21	8.5	1450	9-12

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Generator brush spring tension is 24-28 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, take off hose connections at water pump, loosen plate on front of chain case and swing out of the way. Loosen generator flange nuts, push generator towards motor, lift off chain from sprocket; keep chain from dropping down in chain case by fastening up with wire. Take out flange mounting nuts and lift generator and pump assembly from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oiler every 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. of the generator armature or 6-7 miles per hour with a generator voltage of 6.5-7 volts. Contacts open with a discharge current of 2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch with contacts closed.

LIGHTING:—Aid 'Finger Tip Control' Switch. Lighting switch is mounted at the lower end of the steering column. The starting switch, horn button and light switch are combined in one unit controlled by the lever on the steering wheel. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome, corner, step and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

ERSKINE

DYNAMIC MODEL 53 (1930)
 PRODUCTION STARTED JANUARY 1, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type WJ-1-11, 6 volt, 90 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Battery is mounted on the right frame member under the right front seat.

IGNITION:—Coil Model 526-Q. The ignition switch is built in the base of the coil. Coil is mounted on the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is .5-2.5 ampere at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Mounting:—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect primary lead and manual advance rod

Distributor Model 639-J. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until gap is .020 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 32 degrees reached at 3100 R.P.M. of engine.

and remove distributor head with cables intact. Then take out stop screw on advance arm and lift distributor from place.

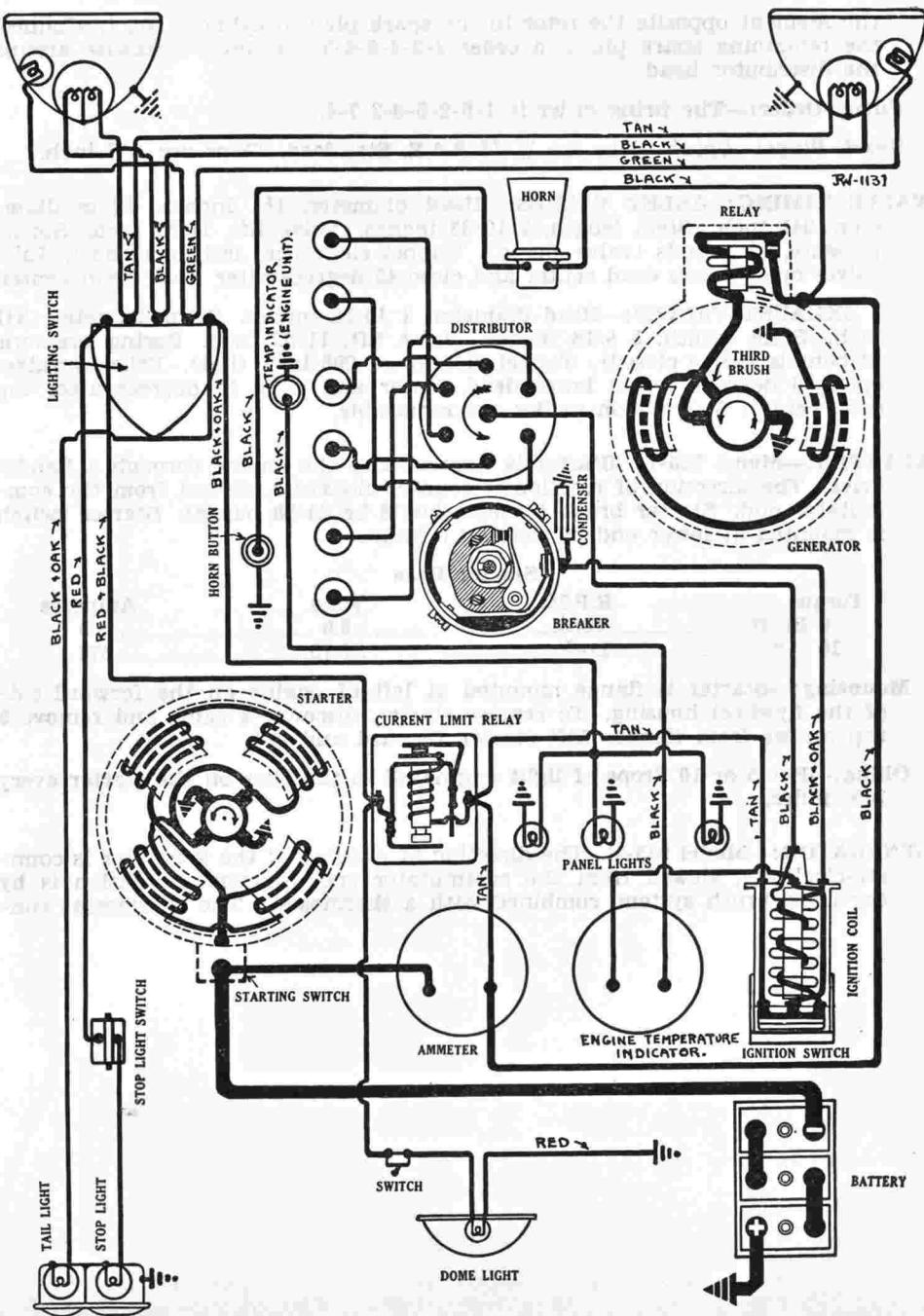
Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and put 4 or 5 drops of light engine oil in the wick oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position $7\frac{1}{2}$ degrees or $\frac{3}{4}$ inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control lever and see that distributor is rotated clockwise to the full extent of the advance arm slot. Remove cover over inspection hole in the flywheel housing and turn engine over until the punch marks on the flywheel (which are $\frac{3}{4}$ inch or $7\frac{1}{2}$ degrees before the top dead center mark 'U-D-C-1-6') are directly in line with the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 counter-clockwise around the distributor head.

The engine can be timed on top dead center with the flywheel mark 'U-D-C-1-6' opposite the indicator if the spark control lever is advanced exactly one half. Place the spark lever midway between the fully retarded and fully advanced positions and crank engine over until the dead center mark is opposite the indicator. Piston No. 1 will be on top dead center entering power stroke and the breaker contacts should open at this point.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 4. Gaps



ERSKINE

DYNAMIC MODEL 53 (1930)

PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, 5/16 inch. Stem length, 5¾ inches. Valve lift, 5/16 inch. Spring pressure, 63-68 pounds (valve closed). Tappet clearance, .004 inch. Inlet valves open 5 degrees after top dead center and close 53 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1½ inches. Stem diameter, 5/16 inch. Stem length, 5¾ inches. Valve lift, 5/16 inch. Spring pressure, 63-68 pounds (valve closed). Tappet clearance, .006 inch. Exhaust valves open 38 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 718-L. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 1050 R.P.M. (armature speed) drawing 275 amperes. Brush spring tension is 24-28 ounces. The starting switch is mounted on the starter field frame and is operated through a flexible control by a button on the dash.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	.5	65
15 "	Lock	3.2	575

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch control and take out the flange mounting bolts and cap screw. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every six weeks or each 2500 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-U. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the small round headed screw on the end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With stan-

dard car setting, the maximum charging rate is 10-12 amperes (hot) reached at 1650 R.P.M. or 20.7 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
15-17	8.0	1400	11-14

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine at rear of accessory bracket. To remove generator, disconnect lead and take out three flange mounting cap screws. Then pull generator to rear to disengage drive coupling and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every six weeks or each 2500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. or 7.5 miles per hour when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-E. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—Model 410-F. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits to protect them against overload and short-circuits. The circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues to vibrate limiting the current to 2-15 amperes. Contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

ESSEX

SUPER SIX (1930) SERIAL NUMBERS 1,165,674 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—Exide, Type 3-XI-13-1G, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member under the driver's seat.

IGNITION: Coil Model CE-4012. Coil is mounted on the front of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. The ignition switch is a Type 9-B Electrolock. The Electrolock must be removed with the distributor as a unit.

Distributor Model IGB-4030, IGB-4033. Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with the breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic. Maximum automatic advance is 10 degrees.

Mounting:—Distributor is mounted on accessory drive bracket at right of engine. To remove distributor, disconnect Electrolock at dash and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place. The Electrolock can be removed from the distributor by following complete directions given under 'Electrolock' in Equipment Section.

Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every 2000 miles. At the same time remove the distributor head and rotor and put a few drops of oil on the breaker arm pivot pin and coat the face of the breaker cam with a light film of vaseline or grease.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Loosen clamp screw in advance arm slot and rotate distributor clockwise as far as possible. Continue to crank engine over until the flywheel mark 'UDC 1&6' is directly opposite the pointer in the inspection hole in the flywheel case at the right of the engine. Then loosen advance arm clamp bolt and rotate distributor counter-clockwise until the contacts begin to open. Check to see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 1 and connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

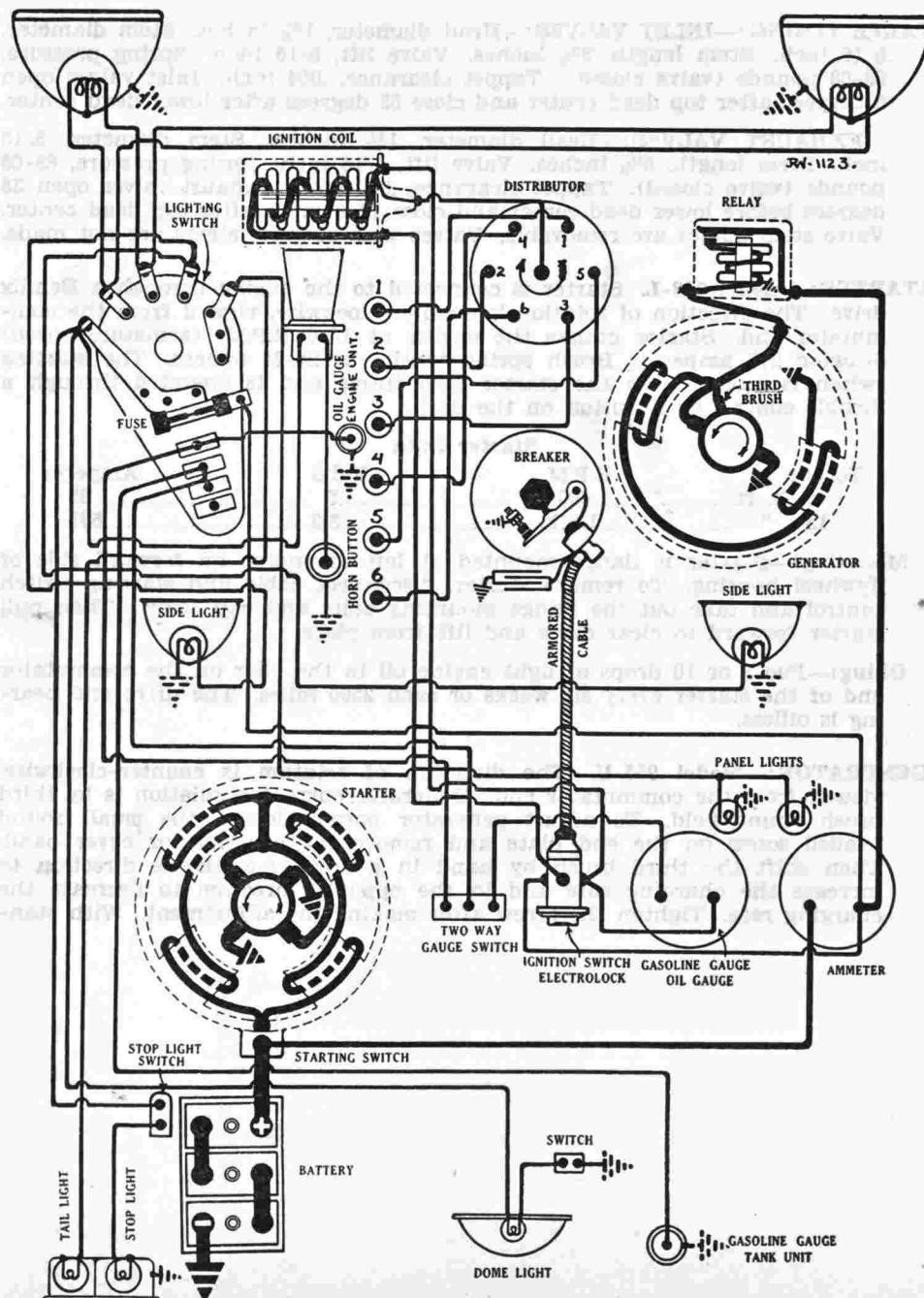
Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .020-.022 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{3}{8}$ inches. Stem diameter, .3085 inch. Stem length, 5 1/32 inches. Valve lift, 5/16 inch. Spring pressure, 50 pounds (valve closed). Tappet clearance, .003-.005 inch (hot).

EXHAUST VALVES:—Head diameter, 1 $\frac{3}{8}$ inches. Stem diameter, .3085 inch. Stem length, 5 1/32 inches. Valve lift, 21/64 inch. Spring pressure, 50 pounds (valve closed). Tappet clearance, .005-.007 inch (hot). Valve stem guides are removable. Valves with oversize stems are not made.

Valve Timing:—To check valve timing, set tappet clearance of No. 1 inlet valve at correct figure and then turn engine over until the inlet opening mark on the flywheel 'IO' which is slightly past the top dead center mark



ESSEX

SUPER SIX (1930) SERIAL NUMBERS 1,165,674 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

'UDC 1&6' is directly opposite the pointer in the inspection hole in the front face of the flywheel housing at the right of the engine. The tappet clearance should be entirely taken up and inlet valve in No. 1 cylinder should begin to open at this point. To set valve timing, crank engine over until piston No. 1 is on top dead center with the flywheel mark 'UDC 1&6' opposite indicator and assemble timing chain so that there are exactly 21 links between the mark on the crankshaft sprocket and the camshaft sprocket.

STARTER:—Model MZ-4017. Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 125 R.P.M. drawing 125 amperes at 5.5 volts. Brush spring tension is $2\frac{1}{2}$ pounds. The starting switch is mounted on the starter field frame and is operated through a flexible control from the dash.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	6	50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	4.0	550

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and lead to ammeter. Remove starting switch control wire. Then take out three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAM-4102. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush by tapping on the brush mounting plate with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate are held in position by friction.

tion between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 14-16 amperes (cold) at 8 volts reached at 1900 R.P.M. or 23 miles per hour.

Generator Data

Ampères	Volts	R.P.M.
0	6.5	620
2	6.9	710
5	7.1	830
10	7.8	1090
14	7.9	1490
15	8.0	1900

Shunt field current is 6.5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is $1\frac{1}{4}$ - $1\frac{1}{2}$ pounds.

Mounting:—Generator is cradle mounted at right of engine and is driven through a flexible hose coupling from the accessory drive shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 1000 miles.

RELAY:—Model CB-4016. Relay is mounted on the generator end plate. Relay closes at 900 R.P.M. or 11 M.P.H. when the generator voltage reaches 7 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Soreng-Manegold Lighting Switch. Lighting switch is mounted at lower end of steering column. The junction block is combined with the lighting switch. Headlights are fitted with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights or side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuse mounted on junction block is 20 ampere capacity.

FORD

NEW MODEL A (1930) FORD GENERATING, STARTING SYSTEM FORD IGNITION

BATTERY:—Ford, 13 plates, 6 volt, 80 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Battery is mounted under the front floor boards on the left frame member.

IGNITION:—Ignition coil is mounted on the dash directly above junction box. Ignition current is 6 amperes at 7 volts with engine running and 4.2 amperes at 6 volts with engine stopped.

Breaker contacts separate .018-.022 inch. Adjust contact opening by loosening lock screw on stationary contact mounting bracket and turning up stud until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 14-20 ounces. Distributor is full manual type. Maximum manual advance is 20 degrees.

Mounting:—Distributor is mounted on the cylinder head between cylinders two and three. To remove breaker plate, disconnect cable in center of cap and four spring connectors to spark plugs, loosen clips and take off cap and terminal assembly. Then loosen lock screw in center of breaker cam and remove cam. Disconnect manual advance rod and turn breaker plate until projections on plate line up with grooves in housing. Then lift breaker plate straight up. The distributor housing can be removed if necessary by loosening the lock nut and backing out the mounting stud on the right side of the engine block directly opposite the distributor mounting. The ignition switch is an Electrolock Type 6-A which is permanently connected to the distributor housing by an armored cable.

Oiling:—Put a few drops of light engine oil in the oiler on the side of the distributor every month or each 1000 miles. At the same time put a small bit of vaseline on the face of the breaker cam.

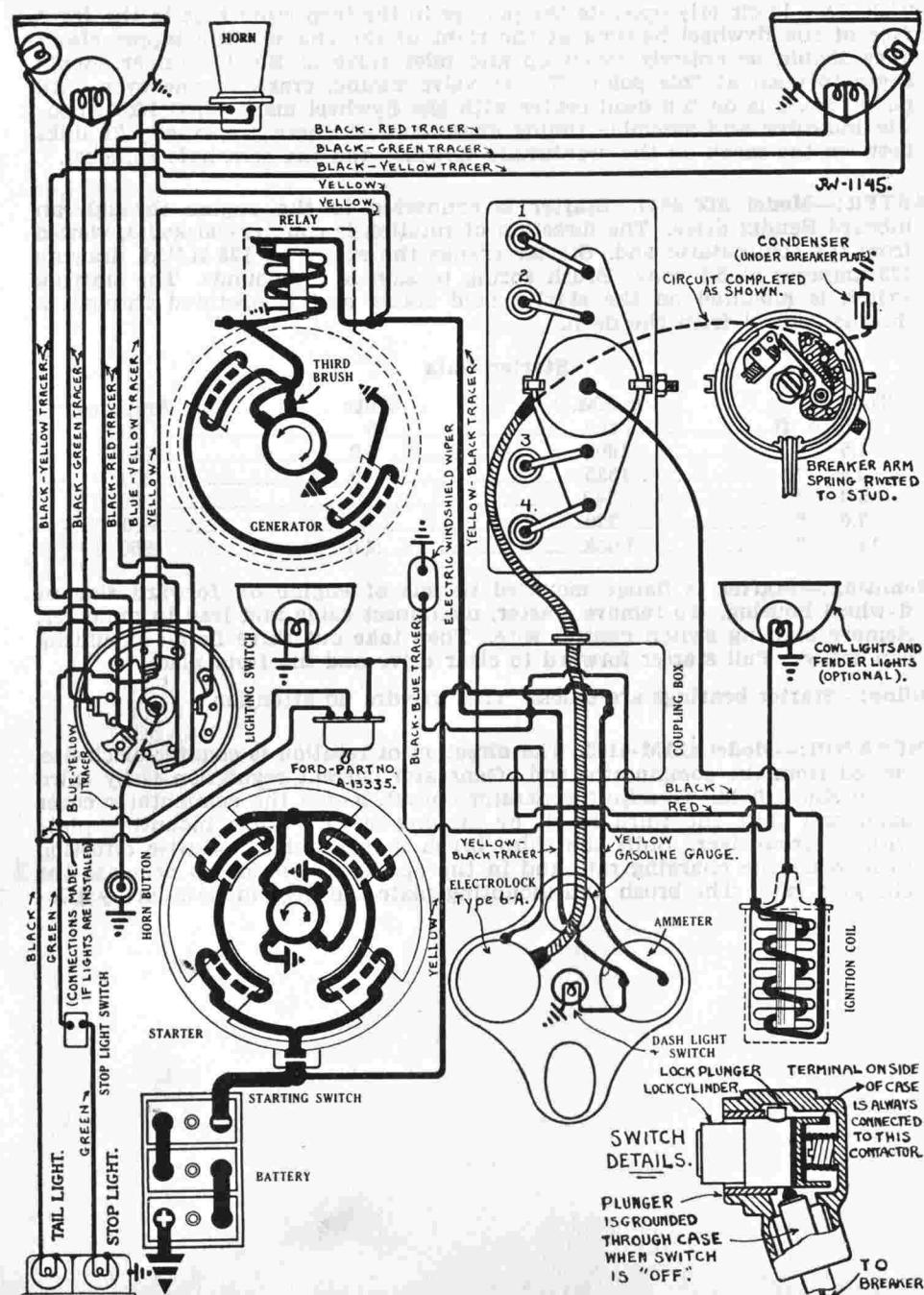
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control lever in the fully retarded position. To set timing, fully retard spark control lever and take out timing pin which is screwed in front face of gear case directly over the camshaft gear. Reverse the pin in the hole and turn engine over slowly, pressing on the pin meanwhile, until the pin drops into the recess in the face of the camshaft gear. This is the top dead center position for piston No. 1. Then remove distributor cap and rotor and loosen the lock screw in the center of the cam. Replace rotor and turn cam until rotor button is directly opposite No. 1 segment (right hand segment on front of distributor housing facing radiator). Remove rotor and shift cam slightly until contacts are just beginning to open. Tighten the lock screw. Be careful to withdraw timing pin and screw it firmly in place in original position before the engine is run.

Firing Order:—The firing order is 1-2-4-3. Number one cylinder nearest the radiator.

Spark Plugs:—Spark plugs are $\frac{7}{16}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{1}{2}$ inches. Stem diameter, $\frac{5}{16}$ inch. Stem length, $5\frac{21}{32}$ inches. Valve lift, .287 inch. Spring pressure, 36 pounds. Tappet clearance, .015 inch. Inlet valves open 7 degrees before top dead center and close 48 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, $1\frac{1}{2}$ inches. Stem diameter, $\frac{5}{16}$ inch. Stem length, $5\frac{21}{32}$ inches. Valve lift, .287 inch. Spring pressure, 36



FORD

NEW MODEL A (1930) FORD GENERATING, STARTING SYSTEM FORD IGNITION

pounds. Tappet clearance, .015 inch. Exhaust valves open 51 degrees before lower dead center and close 1 degree after top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Starter is connected to the engine through an inboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is two pounds. Starter switch is mounted on the field frame. The new type switch has a flat spring and if it is installed on an old starter the starter terminal must be dressed down flat to a height of $11\frac{1}{32}-\frac{3}{8}$ inch. The starter cable terminal has been redesigned and now extends straight out from the cable. The old cable assembly can be used with the new switch by bending the terminal from its right angle position.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2700	6	50
14 "	Lock	3.75	560

Note:—The Bendix drive has been used since October 1, 1928. Previous to that date a special Abell drive was used. The old type starter can be reoperated to take a special Bendix "Service Starter Drive" Ford Part No. A-11350-DR. Under no conditions should the old Model T Bendix drive be installed on these starters. The new Bendix drive can be installed on both ball bearing and plain bearing starters used on cars under 492511. Cars after 492511 have the standard Bendix drive. To install drive, disassemble starter and press off ball bearing on drive end. Then place armature in lathe, check shaft and correct if bent and turn down the large portion of the shaft to a diameter .494-.498 inch to a point $4\frac{1}{2}$ inches from the center of the pilot screw hole in the armature shaft. Be sure to leave a radius of $1\frac{1}{32}-\frac{1}{8}$ inch at the end of the cut. If a sharp shoulder is left or the shaft is undercut at this point, the armature shaft will be weakened and will break at this point in service. When the operation is completed, the turned down portion of the shaft should be the same diameter as the original end of the shaft and should merge with it without any shoulder or roughness. Polish the shaft with a fine file in the lathe. Then turn out the hole in the bearing retainer plate to an inside diameter of $1\frac{1}{16}$ inches to clear the Bendix drive stop nut. In reoperating the plain bearing starter, the face or boss of the bearing in the end plate must be cut back a distance of $9/64$ inch, making the bearing $1\frac{1}{16}$ inches long to clear the Bendix assembly. When the Bendix drive is assembled the stop nut should be against the shoulder on the shaft but the spring should not be compressed more than $1/16$ inch.

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and pedal rod or remove starter switch (this is the quickest method). Then remove flange mounting cap screws and pull starter forward. Lift starter from place. In some cases shims were used between the starter flange and the flywheel case to secure proper clearance of $1/32$ - $1/16$ inch between the flywheel and the pinion on the old type starter with Abell drive. These shims should not be used with the starter equipped with Bendix drive.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—The generator has been modified and a new type two pole three brush generator is now being used. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by hand. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by the spring tension of the third brush holder. For normal driving during summer months the generator charging rate should be set at 6 amperes.

Mounting:—Generator is mounted at the left of the engine and is belt driven by the fan belt. To remove generator, disconnect the lead and loosen the clamp bolt on the adjustment bracket. Swing generator toward the engine and slip off drive belt. Then remove bolt in mounting lug under the generator and lift generator from place.

Oiling:—Put 2 or 3 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Relay is mounted on the generator.

LIGHTING:—The old lighting switch Part No. A-11664 (contact) A-11658 (Switch Body) has been superseded by a new switch Part No. A-11654-B but the old type will be furnished for replacement of old units. Switch is mounted on the lower end of the steering column. Headlights are now "Twolite" using 21 cp. double filament bulbs. Two types are used, Ford Part No. A-13005-C (with dimmer bulbs) and Part No. A-13005-D (for use with fender lights or cowl lights). Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110 or 6-8 volt, 32-21 cp. D.C. Mazda "Ford" type (for use in states where laws permit). Stop light is 6-8 volt, 21 cp. S.C. Mazda 1129. Dimmer lights, fender lights for parking and cowl lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FRANKLIN

SERIES 145 AND 147 (1930) SERIAL NUMBERS 198,000 UP
 PRODUCTION STARTED DECEMBER 2, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-19. U.S.L., Type XY-19-X6. Webco, Type PB-19. Exide, XC-19, 6 volt, 135 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 145 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted under the right front seat.

IGNITION: Coil Model 528-X. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.7-2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Distributor Model 642-B. Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate (directly behind contacts) and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. It is designed to operate under all ordinary conditions with the manual spark control button in the fully advanced position (pushed all the way in toward the dash). Pulling out the spark control button provides an auxiliary retard for starting or full load operation at low speeds. Maximum manual advance is 10 degrees. Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 29 degrees reached at 2400 R.P.M. of engine.

Mounting:—Distributor is mounted on the crankcase at the right of the engine. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then loosen advance arm clamp bolt and lift distributor from place.

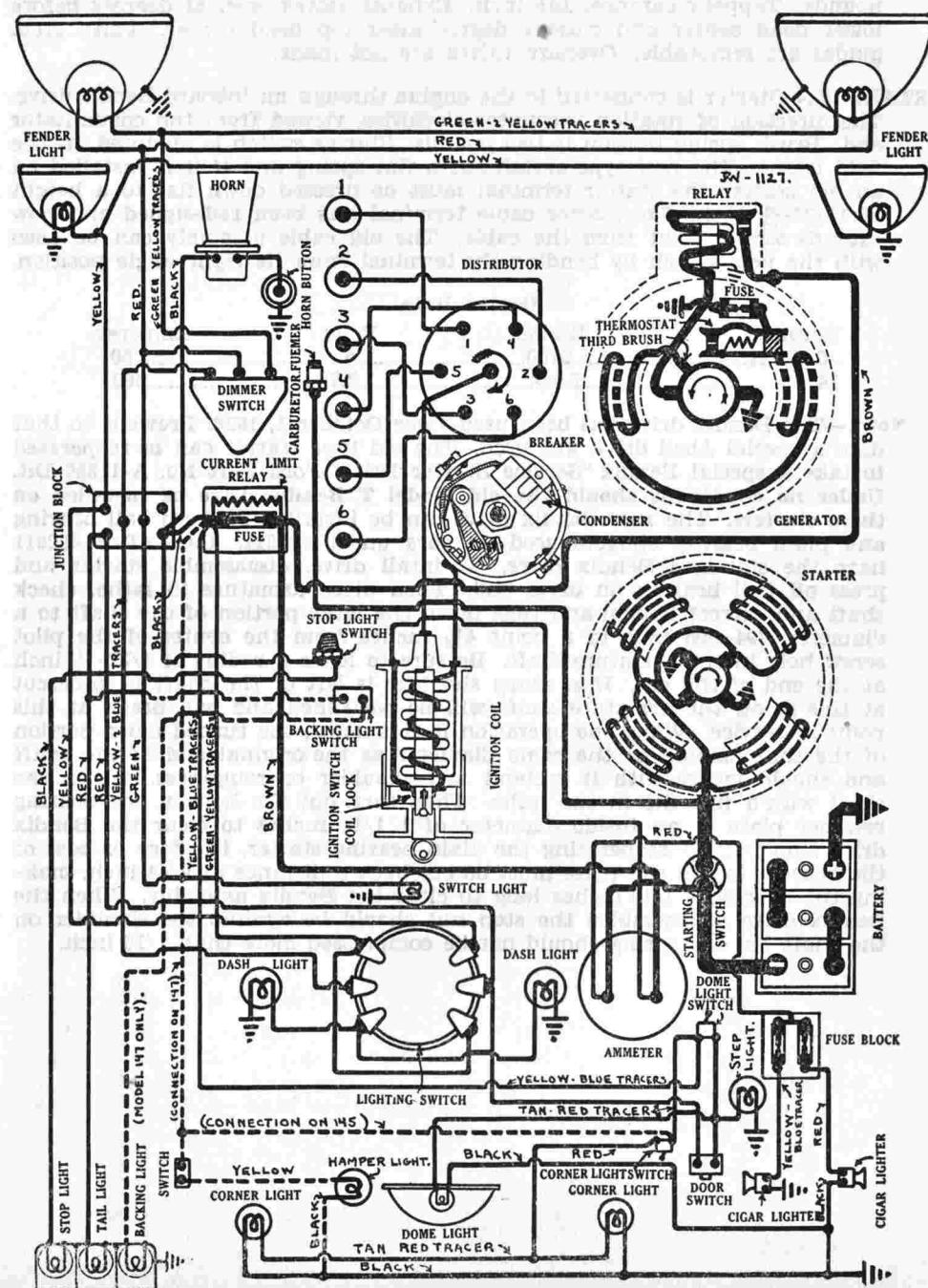
Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every 1000 miles of operation. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light machine oil. Put a few drops of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $\frac{1}{8}$ inch (on the flywheel) before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Place spark control button in fully advanced position (pushed all the way in toward the dash) and see that distributor is turned counter-clockwise as far as possible. Remove cover on fanwheel inspection hole at right of engine and crank engine over until the triangular slot on the fanwheel is exactly $\frac{1}{8}$ inch before or to the right of the line on the fanwheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and check to see that the segment opposite the rotor in the distributor head is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 27/32 inches. Stem diameter, .3725 inch. Stem length, 6.194-6.214 inches. Valve lift, 5/16 inch. Spring pressure, 47-52 pounds (valve closed) and 84 pounds (valve open). Tappet clearance, .007 inch. Intake valves open 12 degrees after top dead center



FRANKLIN

SERIES 145 AND 147 (1930) SERIAL NUMBERS 198,000 UP
 PRODUCTION STARTED DECEMBER 2, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1 21/32 inches. Stem diameter, .3725 inch. Stem length, 5.256-5.276 inches. Valve lift, 9/32 inch. Spring pressure, 47-52 pounds (valve closed) and 81 pounds (valve open). Tappet clearance, .005 inch. Exhaust valves open 54 degrees before lower dead center and close 14 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 723-C. Starter is connected to the engine through reduction gears and an inboard drive. The direction of rotation (armature shaft) is clockwise, viewed from the commutator end. Starter cranks the engine at 175 R.P.M. drawing 135 amperes at 5 volts. Brush spring tension is 24-28 ounces. Starter switch is Model 404-W.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3500.....	5.....	70.....
2 ".....	2550.....	5.....	135.....
22 ".....	Lock.....	3.5.....	620.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the starter every 1000 miles of operation. Once each year remove the grease plug in the reduction gear case and repack the gear compartment with graphite grease.

GENERATOR:—Model 957-E. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 190°F. cutting the resistance connected across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 16-18 amperes at 8 volts reached at 1700 R.P.M. or 25-27 miles per hour.

Generator Data

Cold Test			Hot Test		
Ampères	Volts	R.P.M.	Ampères	Volts	R.P.M.
16-18.....	8.6.....	1650.....	10.....	7.6.....	1800.....

A five ampere field fuse is connected in the field circuit. Shunt field current is 4 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. The generator drive sprocket is mounted on a journal between the flange and the chain case allowing the generator to be removed without disturbing the timing chain.

To remove generator, disconnect lead and take out the two upper flange mounting cap screws. Then remove the nut on the rear end of the lower flange mounting stud. Do not disturb the nut on the forward end of the stud. Pull generator to the rear and lift from place.

Timing Chain Adjustment. Timing chain is adjusted by shifting the generator. To adjust chain, loosen the two upper flange mounting cap screws and the nut on the forward end of the lower flange mounting stud. Then remove the timing case inspection plug and shift generator outward away from the engine until the up and down free movement of the chain is $\frac{3}{8}$ - $\frac{1}{2}$ inch. Tighten the mounting screws and nut. With the proper adjustment the chain should run noiselessly. If the chain hums with the engine running the chain tension is excessive and the adjustment too close and the generator must be backed off until the chain runs without noise.

Oiling:—Put 8 or 10 drops of light machine oil in the oiler on the commutator end of the generator every 1000 miles of operation. The drive end bearing is oiled from the chain case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 680 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.25 volts and open with a discharge current of 1.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-J. Lighting switch is mounted on the instrument board. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are controlled by a switch mounted at the base of the steering column operated by a lever on the steering wheel. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light and backing light (used on Series 147) are 6-8 volt, 21 cp. S.C. Mazda 1129. Corner lights on closed cars are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—This is a protective device connected in the lighting circuits. It consists of a fixed resistance connected across a 20 ampere fuse. When the current in the lighting circuit reaches 20 amperes the fuse will burn out causing the lighting current to flow through the resistance which limits the current to 30 amperes.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuse mounted on Current Limit Relay is 20 ampere capacity. Lighting fuses for closed car body circuits (mounted on fuse block on dash) are 30 ampere capacity.

GARDNER

MODEL 136 (1930) SERIAL NUMBERS SST-827 UP
 PRODUCTION STARTED JULY 1, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member under the front floor boards.

IGNITION:—Coil Model 526-W. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

Distributor Model 640-L. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock nut on stationary contact mounting plate (located directly behind contacts) and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 17.5 degrees (engine) reached at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance control and primary lead and remove distributor head with cables intact. Then take out manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 5000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

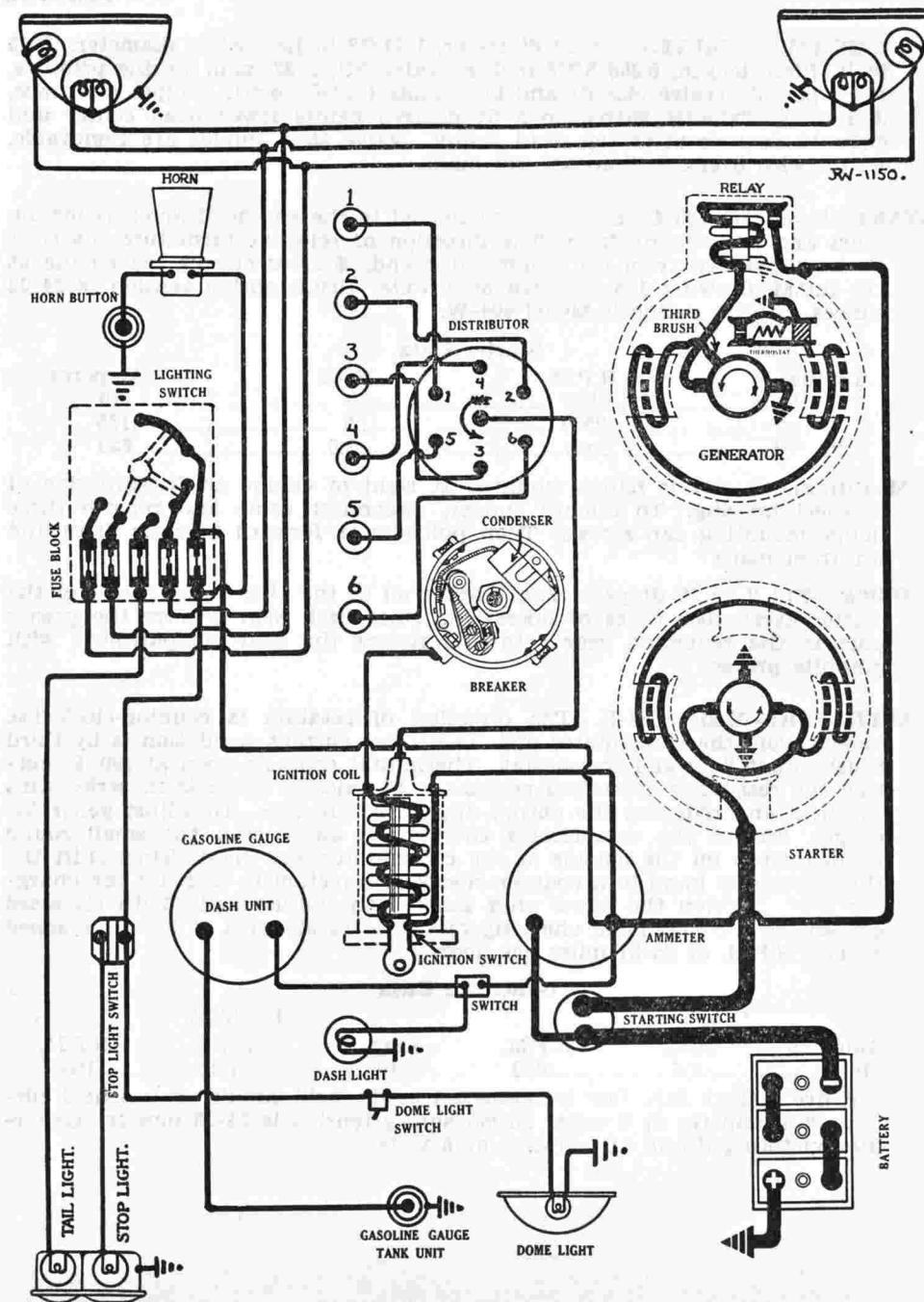
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8 degrees (on the flywheel) before top dead center with the manual spark control fully advanced. To set timing, crank engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control. Turn engine over until a point on the flywheel 8 degrees or two teeth before the top dead center mark is directly opposite the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{17}{32}$ inches. Stem diameter, .341-.3425 inch. Stem length, $5\frac{5}{8}$ inches. Valve lift, $11\frac{1}{32}$ inch. Spring pressure, 44 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open 5 degrees before top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $1\frac{3}{32}$ inches. Stem diameter, .341-.3425 inch. Stem length, $5\frac{5}{8}$ inches. Valve lift, $11\frac{1}{32}$ inch. Spring pressure,



GARDNER

MODEL 136 (1930) SERIAL NUMBERS SST-827 UP
 PRODUCTION STARTED JULY 1, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

44 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made for replacement.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. The starting switch is an electro-magnetic unit mounted on the starter field frame. It is controlled by a button on the instrument board.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3000.....	5.....	70.....
15 ".....	Lock.....	3.7.....	450.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch leads. Then remove three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M. or 30 miles per hour.

Generator Data

Cold Test			Hot Test		
Ampères	Volts	R.P.M.	Ampères	Volts	R.P.M.
19-21.....	8.5.....	1450.....	9-12.....	7.5.....	2000.....

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine by special swinging bracket and is belt driven from the crankshaft. The water pump is mounted on the rear of the generator and is driven by an extension of the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then remove adjustment clamp bolt and swing generator toward the engine. Slip off drive belt. Take out the two bolts holding generator on the mounting bracket and lift generator and water pump assembly from place. The water pump can then be removed from the generator by taking out the two mounting screws.

Belt Adjustment. The driving belt tension is adjusted by shifting the generator. To take up driving belt, loosen the adjustment clamp bolt and swing generator out away from the engine until the proper belt tension is secured. Tighten the clamp bolt. The belt should be tight enough to drive the generator and pump without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 6-7 M.P.H. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 420-Q. Lighting switch is mounted at lower end of steering column and is controlled by a lever on the steering wheel. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—Five lighting fuses are mounted on a fuse block on the switch. They are 10 ampere capacity.

NOTE:—Gardner models are now equipped with an electromagnetic starting switch controlled by a button on the dash. Wiring details of this switch are not available at the present time.

GARDNER

MODEL 140 (1930)
 PRODUCTION STARTED JULY 1, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 615-JFK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member under the front floor boards.

IGNITION:—Coil Model 526-W. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is .6-.2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

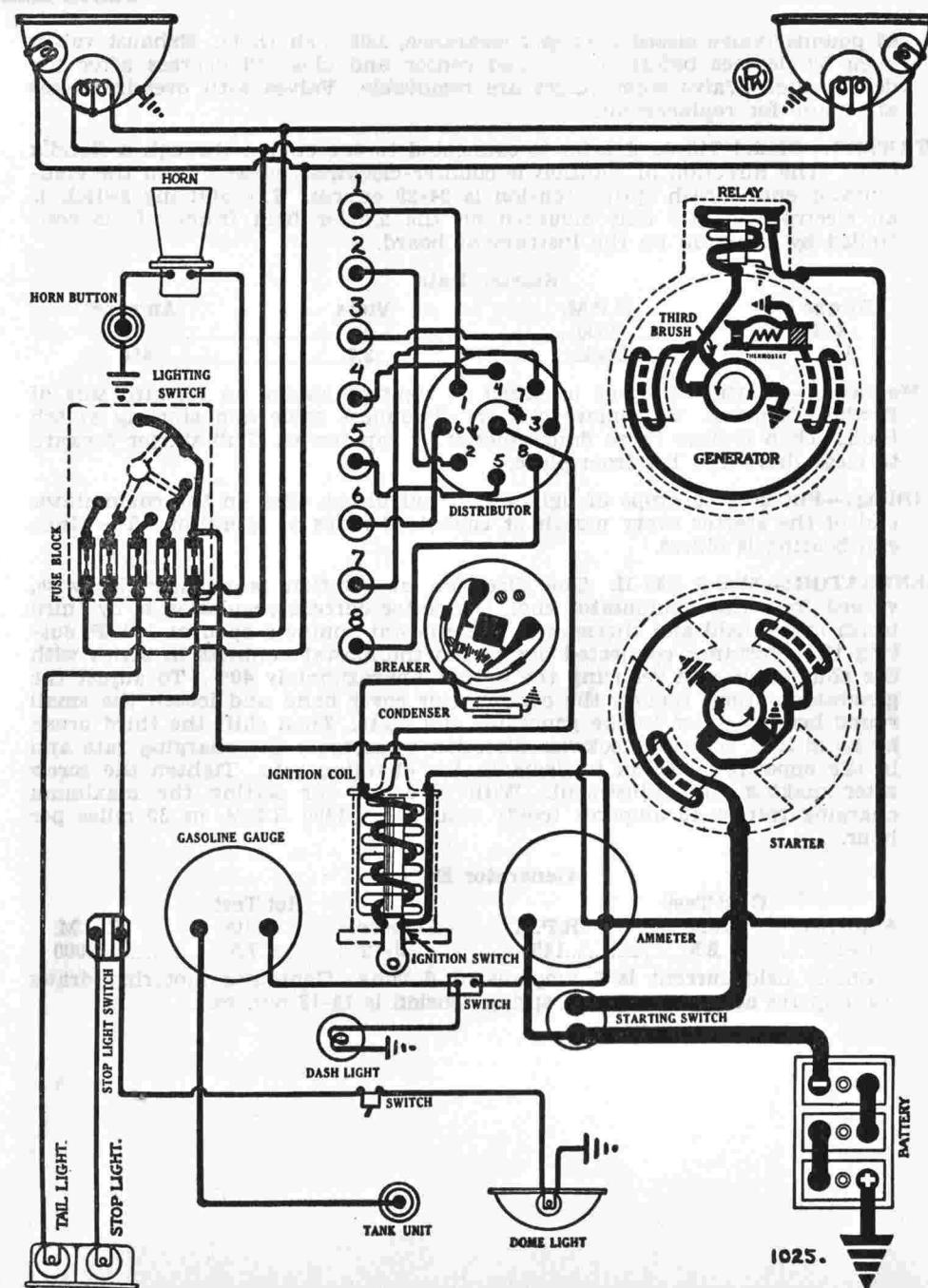
Distributor Model 658-B. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. There are two sets of breaker contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set for satisfactory engine performance by synchronizing contacts. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 17.5 degrees (engine) reached at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance control and primary lead and remove distributor head with cables intact. Then take out manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 5000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Use Delco-Remy special tool, Part No. 820738, and follow directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (6 degrees or 1½ teeth on the flywheel before top dead center). Loosen two lock screws on breaker sub-plate and shift plate by turning eccentric adjusting screw until the second set of contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 6 degrees or 1½ teeth on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control lever. Turn engine over until a point on the flywheel 6 degrees or 1½ teeth before the top dead center point is directly opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until one set of contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1.



GARDNER

MODEL 140 (1930)

PRODUCTION STARTED JULY 1, 1929
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Firing Order:—The firing order is 1-6-2-5-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, .341-.3425 inch. Stem length, 5 1/4 inches. Valve lift, 11/32 inch. Spring pressure, 44 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, .341-.3425 inch. Stem length, 5 1/4 inches. Valve lift, 11/32 inch. Spring pressure, 44 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made for replacement.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. The starting switch is an electro-magnetic unit mounted on the starter field frame. It is controlled by button on the dash.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	5	70
15 "	Lock	3.7	450

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch leads. Then remove three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the commutator end of the starter every month or each 1000 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M. or 30 miles per hour.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
19-21.....	8.5.....	1450	9-12.....	7.5.....	2000

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine by special swinging bracket and is belt driven from the crankshaft. The water pump is mounted on the rear of the generator and is driven by an extension of the generator shaft. To remove generator, first drain radiator and remove water pump hose connections. Then remove adjustment clamp bolt and swing generator toward the engine. Slip off drive belt. Take out the two bolts holding generator on the mounting bracket and lift generator and water pump assembly from place. The water pump can then be removed from the generator by taking out the two mounting screws.

Belt Adjustment. The driving belt tension is adjusted by shifting the generator. To take up driving belt, loosen the adjustment clamp bolt and swing generator out away from the engine until the proper belt tension is secured. Tighten the clamp bolt. The belt should be tight enough to drive the generator and pump without slipping. Any excessive belt tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 6-7 M.P.H. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 420-Q. Lighting switch is mounted at lower end of steering column and is controlled by a lever on the steering wheel. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—Five lighting fuses are mounted on a fuse block on the switch. They are 10 ampere capacity.

NOTE:—Gardner models are now equipped with an electromagnetic starting switch controlled by a button on the dash. Wiring details of this switch are not available at the present time.

GARDNER

MODEL 150 (1930) SERIAL NUMBERS SSL-367 UP
 PRODUCTION STARTED JULY 1, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Prest-O-Lite, Type 617-RHK, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 152 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 27 hours. Battery is mounted on right frame member under the front floor boards.

IGNITION:—Coil Model 526-W. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is .6-2.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

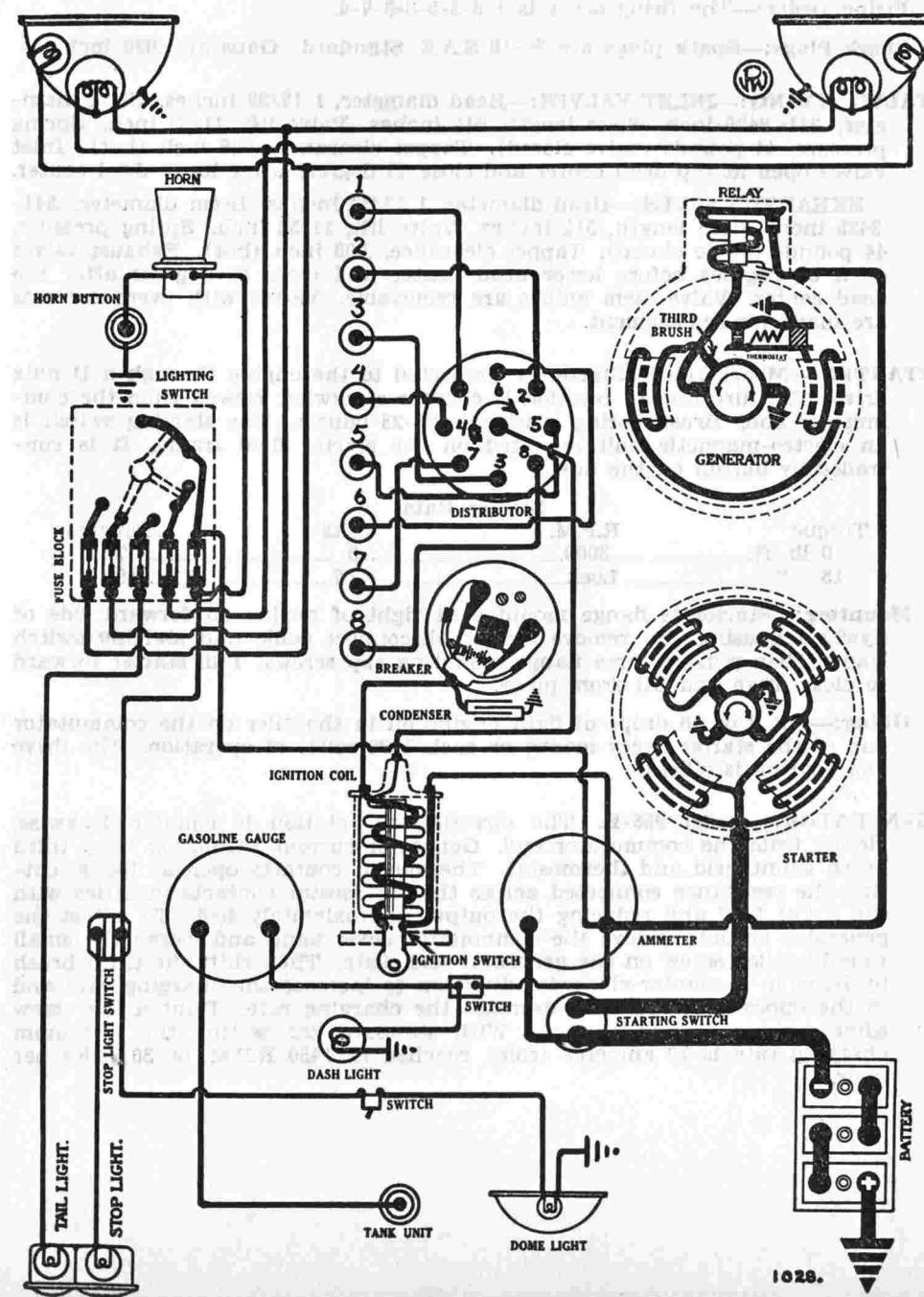
Distributor Model 658-R. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until breaker gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. There are two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degrees firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 17.5 degrees reached at 2000 R.P.M.

Mounting:—Distributor is mounted in well on top of cylinder head. To remove distributor, disconnect manual advance control and primary lead and remove distributor head with cables intact. Then take out manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup under the distributor head with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 5000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Use special Delco-Remy tool, Part No. 820738, and follow directions given in Equipment Section. Contacts can be synchronized without use of special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (6 degrees or 2 teeth on the flywheel before top dead center). If the second set of contacts mounted on the movable sub-plate do not open at this point, loosen the two lock screws and turn the eccentric adjusting screw until contacts open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 6 degrees or two teeth on the flywheel before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance the spark control lever. Turn engine over until a point on the flywheel 6 degrees or two teeth before the top dead center point is exactly opposite the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp



GARDNER

MODEL 150 (1930) SERIAL NUMBERS SSL-367 UP
 PRODUCTION STARTED JULY 1, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as indicated on the wiring diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, $11/32$ inch. Stem length, $4\frac{1}{8}$ inches. Valve lift, $5/16$ inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .006 inch (hot). Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, $1\frac{15}{32}$ inches. Stem diameter, $11/32$ inch. Stem length, $4\frac{1}{8}$ inches. Valve lift, $5/16$ inch. Spring pressure, 36 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made for replacement.

STARTER:—Model 720-Y. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starting switch is an electro-magnetic unit mounted on the starter field frame. It is controlled by a button on the instrument board.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5.0	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting switch leads and take out three flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the starter every month or each 1000 miles of operation.

GENERATOR:—Model 955-K. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F . cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting the maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M. or 30 M.P.H.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.5.....	1450.....	9-12.....	7.5.....	2000.....

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, first drain radiator and take off hose connections to water pump (mounted on the rear of the generator). Then loosen plate on front of chain case and swing out of the way. Loosen generator flange mounting nuts, push generator toward motor and lift drive chain off generator sprocket. Tie up the chain to prevent it slipping off camshaft sprocket. Take out the flange mounting nuts. Pull generator to the rear to clear drive sprocket and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the generator oiler every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 6-7 M.P.H. when the generator voltage reaches 6.75 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Model 420-Q. Lighting switch is mounted at the lower end of the steering column and is controlled by a lever on the steering wheel. Double filament headlight bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights in headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Side lights (when used) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—There are five lighting fuses mounted on a fuse block on the lighting switch. They are 10 ampere capacity.

NOTE:—Gardner models are now equipped with an electromagnetic starting switch controlled by a button on the dash. Wiring details of this switch are not available at the present time.

GRAHAM
STANDARD SIX MODEL 44 (1930)
SERIAL NUMBERS 900,001 UP. PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted on the right frame member under the right front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the rear of the dash. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' coincidental steering post and ignition switch lock.

Distributor Model 639-K. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock nut on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. It is designed to operate under normal conditions in the full manual advance position with the spark control button pushed all way in toward the dash. Pulling out the button provides an auxiliary retard for starting. Maximum manual advance is 15 degrees (distributor). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2800 R.P.M. of the engine.

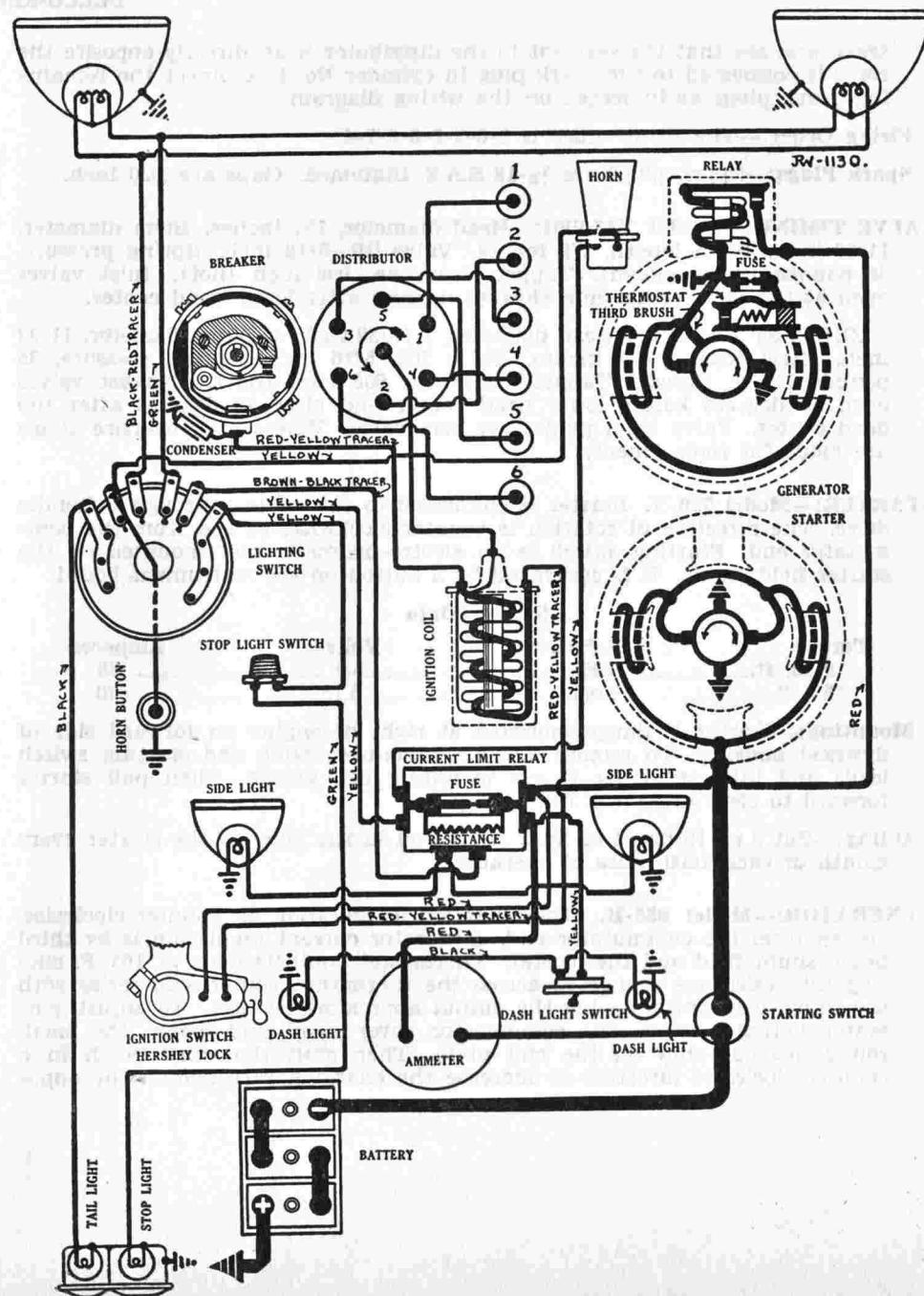
Mounting:—Distributor is mounted on the cylinder head. It may be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. The distributor may be removed without disturbing timing providing the advance arm is left in place. The manual advance control wire and hold-down screw should be disconnected and the distributor can then be lifted out. Distributor drive is through an offset tongue and slot coupling. In mounting distributor, make certain that the tongue enters the slot properly.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and saturate the wick in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position 1 degree or 7/64 inch on the standard 12 $\frac{3}{8}$ inch diameter flywheel before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Place the spark control button in the fully advanced position (pushed all the way in toward the dash). Continue to crank engine over until the flywheel mark 'IGNI' which is 1 degree or 7/64 inch before the top dead center mark 'Top DC 1&6' is directly opposite the indicator on the flywheel housing. Loosen advance arm clamp screw and rotate distributor in a clockwise direction until the contacts begin to open. Tighten the clamp screw and check position of rotor to see that it is directly opposite segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are standard $\frac{3}{8}$ -18 S.A.E. Gaps are .023-.025 inch.



GRAHAM

STANDARD SIX MODEL 44 (1930)

SERIAL NUMBERS 900,001 UP. PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (end of stem to top of seat). Valve lift, .3125 inch. Spring pressure, 50-55 pounds, valve closed. Tappet clearance, .010 inch (hot). Inlet valves open at top dead center and close 40 degrees after lower dead center. The flywheel is marked at point of inlet opening by marks 'IN.OP. 1&6' and 'TOP.DC 1&6.'

EXHAUST VALVES:—Head diameter, 1 15/32 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (end of stem to top of seat). Valve lift, .3175 inch. Spring pressure, 50-55 pounds, valve closed. Tappet clearance, .010 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked at point of exhaust closing by mark 'EX.CL 1 & 6.' Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 713-K. Starter is connected to the engine through an in-board Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 120 R.P.M. drawing 218 amperes at 4.9 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000.	5.6	65
3.6 "	1296.	5.0	218
12 "	Lock.	3.6	.510

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove nuts on three flange mounting studs. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the commutator end of the starter every two weeks or each 500 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 955-Q. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator

output, remove the commutator cover band and loosen the small round headed screw on the outside of the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the lock screw after making the adjustment. With standard car setting, the maximum charging rate is 10.8 amperes (hot) at 7.5 volts reached at 1800 R.P.M. or 32 M.P.H.

Generator Data

Cold Test

Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.5	1450	10	7.5	1800-2000

Generator brush spring tension is 16-18 ounces. Shunt field current is 4-6.1 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at right of engine and is driven through a flexible hose coupling from an extension of the water pump shaft. To remove generator, disconnect lead and loosen mounting band. Disconnect hose coupling and slide generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 700 R.P.M. or 12 miles per hour when the generator voltage reaches 7-7.4 volts and opens with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 50239. Lighting switch is mounted at the lower end of the steering column. Headlights equipped with double filament bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights or side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail light is 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and it must be correctly mounted so that the tail light lead is connected to the 3 cp. filament. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

NOTE:—The stop light switch is of the hydraulic type and is screwed into the forward end of the brake master cylinder.

FUSES:—Lighting fuse mounted on fuse block on the dash is 20 ampere capacity.

GRAHAM

SPECIAL SIX MODEL 45 (1930)

SERIAL NUMBERS 736001 UP. PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member under the right front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the rear of the dash. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' co-incidental steering post and ignition switch lock.

Distributor Model 640-W. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate behind contacts and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. It is designed to operate under all ordinary conditions with the manual advance control fully advanced with the spark control button pushed all the way in toward the dash. Pulling out the button provides an auxiliary control for starting. Maximum manual advance is 15 degrees (distributor). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2400 R.P.M. of engine.

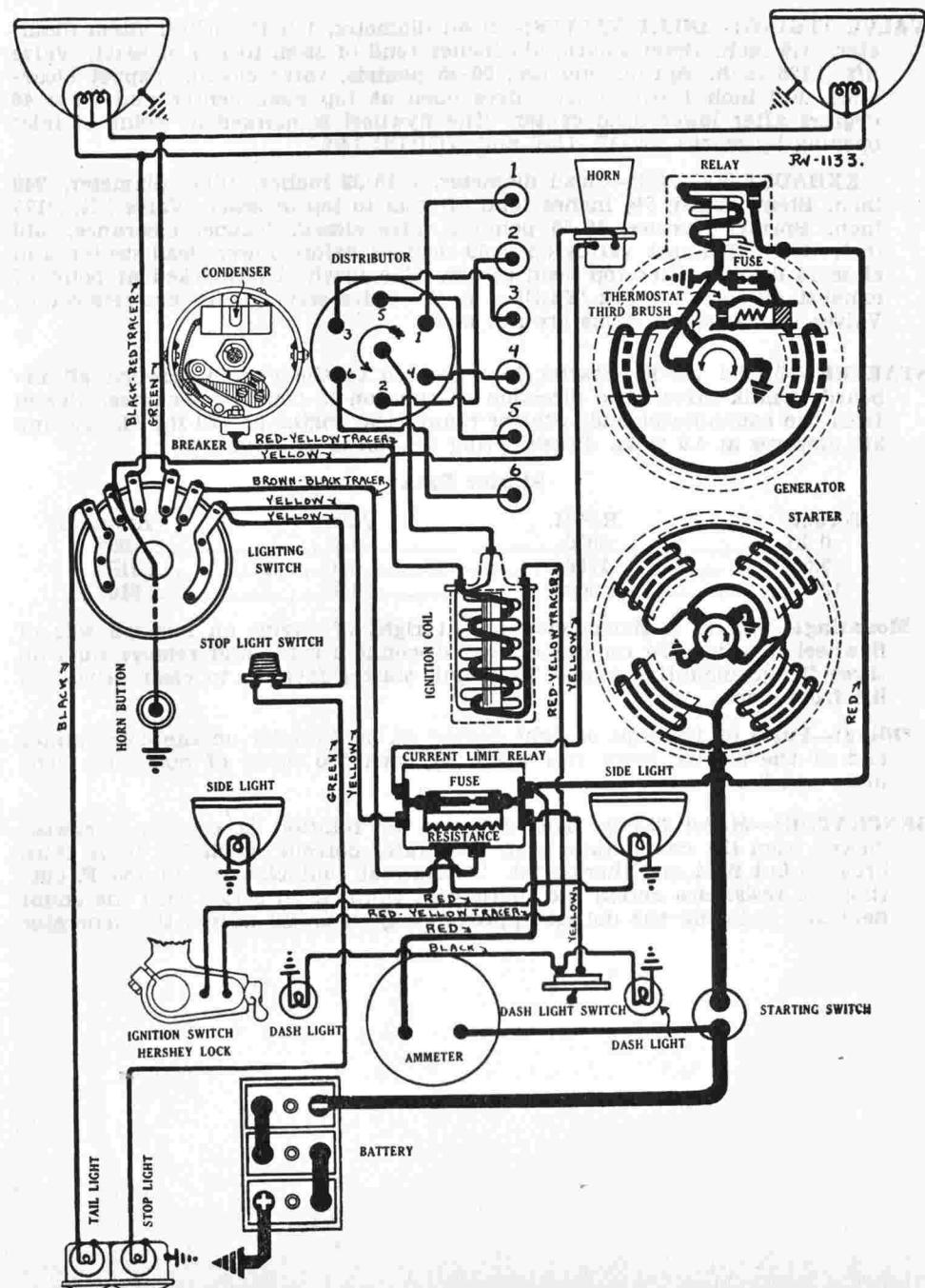
Mounting:—Distributor is mounted on the cylinder head and can be removed from the left side. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. If it is desired to remove distributor without disturbing timing setting, leave the advance arm clamped in place and disconnect the spark control wire and take out the hold-down screw in the advance arm. Distributor drive is through an offset tongue and slot coupling. The distributor cannot be mounted incorrectly if the shaft is turned until the tongue engages the slot correctly.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and saturate the wick in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are standard $\frac{7}{8}$ -18 S.A.E. Gaps are .023-.025 inch.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 2 degrees or $7/32$ inch on the $12\frac{1}{8}$ -inch flywheel before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Make certain that spark control button is pushed all the way in toward the dash and that distributor housing is rotated clockwise as far as possible. Continue to crank engine until the 'Spark Full Advance' mark on the flywheel which is 2 degrees before the top dead center mark 'TOP DC 1&6' is opposite the indicator on the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and check position of rotor to see that it is directly opposite the segment connected to the spark plug in cylinder No. 1.



GRAHAM

SPECIAL SIX MODEL 45 (1930)
 SERIAL NUMBERS 736001 UP. PRODUCTION STARTED JANUARY 1, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (top of seat to end of stem). Valve lift, .3125 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (hot). Inlet valves open at top dead center and close 40 degrees after lower dead center. The flywheel is marked 'IN.OPEN 1&6' and 'TOP DC 1&6' at the point of inlet opening.

EXHAUST VALVES:—Head diameter, 1 15/32 inches. Stem diameter, .340 inch. Stem length, 5 1/2 inches (top of seat to end of stem). Valve lift, .3175 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked 'EX.CLOSE 1&6' at the point of exhaust valve closing. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 718-E. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 120 R.P.M. drawing 218 amperes at 4.9 volts. Brush spring tension is 24-28 ounces.

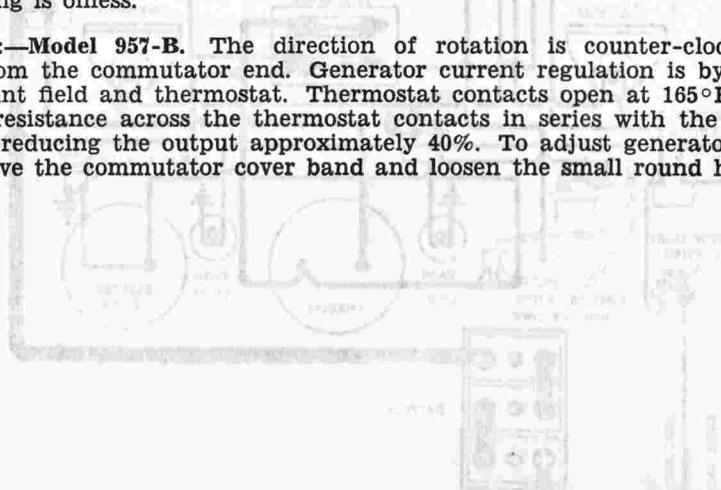
Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5200.....	5.7.....	60.....
3.6 ".....	1368.....	4.9.....	218.....
15 ".....	Lock.....	3.2.....	570.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove nuts on three flange mounting studs. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in oiler on the commutator end of the starter every two weeks or each 500 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 957-B. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed



screw on the outside of the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.7 volts reached at 1600 R.P.M. or 33 M.P.H.

Generator Data

Amperes	Cold Test		Hot Test	
	Volts	R.P.M.	Volts	R.P.M.
18-20.....	8.5.....	1300.....	10-12.....	7.5.....

Shunt field current is 4-6.1 amperes at 6 colts. There is a six ampere field fuse mounted on the end plate which is connected in the field circuit. Brush spring tension is 16-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the right of the engine and is driven through a flexible hose coupling from an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 550 R.P.M. when the voltage of the generator reaches 7-7.4 volts and opens with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Briggs & Stratton Switch Model 50239. Lighting switch is mounted at lower end of steering column. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

FUSES:—Generator field fuse is 6 ampere capacity. Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

GRAHAM

STANDARD EIGHT MODEL 42 (1930) SERIAL NUMBERS 660,001 UP
 SPECIAL EIGHT MODEL 42 (1930) SERIAL NUMBERS 615,000 UP
 PRODUCTION STARTED JANUARY 1, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member under the right front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the rear of the dash. Ignition current is 1.4 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' co-incidental steering post and ignition switch lock.

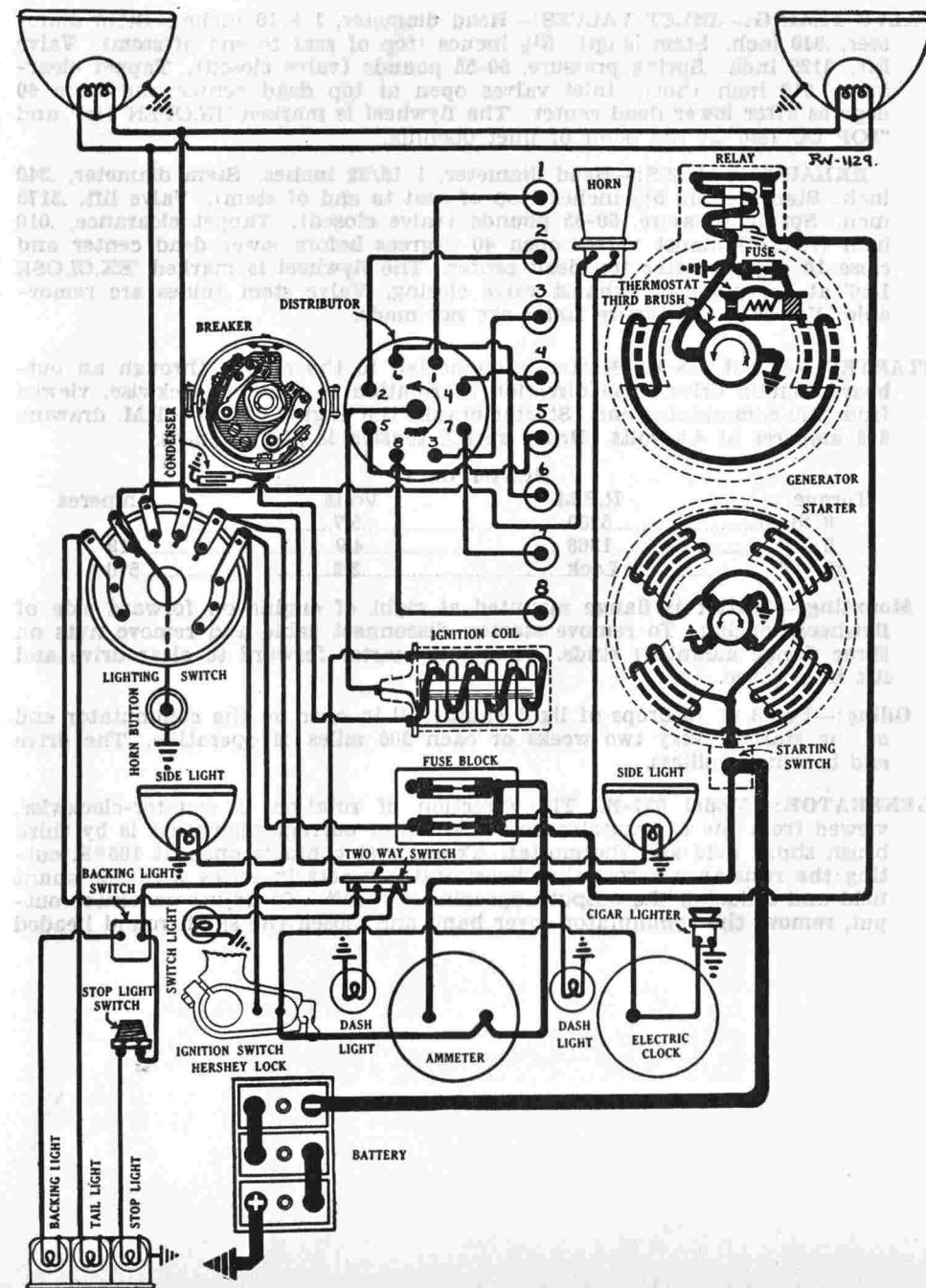
Distributor Model 660-C. Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind contacts and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. It is designed to operate under all normal conditions in the fully advanced position with the spark control button pushed all the way in toward the dash. Pulling out the spark control button provides an auxiliary retard for starting. Maximum manual advance is 15 degrees (distributor). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 2600 R.P.M. of engine. The distributor has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for correct performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and can be removed from the left side. To remove distributor, disconnect the primary lead and remove the distributor head with the cables intact. Then loosen advance arm clamp screw and lift distributor from place. The distributor can be removed without disturbing the timing if the advance arm is left clamped to the distributor and the spark control wire and hold-down screw are taken out. Distributor is driven through an offset tongue and slot coupling. The tongue and slot can only be assembled in the correct position.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Contacts must be synchronized so that the set mounted on the movable sub-assembly within the distributor housing begin to open at a point exactly 45 degrees (distributor) after the first set for satisfactory ignition performance. To synchronize contacts, use special Delco-Remy tool, Part No. 820738, and follow directions in the Equipment Section. The contacts can be synchronized without special equipment after the distributor has been timed to the engine by cranking the engine over 90 degrees until piston No. 6 reaches firing position when the flywheel mark 'SFADV-6' will be opposite the indicator. If the second set of contacts do not begin to open at this point, loosen the two locking screws on the base plate and turn the eccentric adjusting screw until the contacts open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .020 inch and repeat synchronization.

Timing Distributor to Engine. The breaker contacts begin to open when the piston entering power stroke reaches a position 5 degrees or $35/64$ inch



GRAHAM

**STANDARD EIGHT MODEL 42 (1930) SERIAL NUMBERS 660,001 UP
SPECIAL EIGHT MODEL 42 (1930) SERIAL NUMBERS 615,000 UP
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION**

on the standard 12 $\frac{1}{8}$ -inch diameter flywheel with the manual spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). See that spark control button is pushed all the way in toward the dash. Continue to crank engine until flywheel mark 'SFADV-1' is directly opposite the indicator in the flywheel housing on the left front side of the engine. Loosen advance arm clamp screw and rotate distributor until the contacts mounted directly on the breaker base plate begin to open. Tighten the clamp screw and check to see that rotor is directly opposite the segment connected to the spark plug in cylinder No. 1. The contacts can now be synchronized if this operation has not been completed.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are standard $\frac{7}{8}$ -18 S.A.E. Gaps are .023-.025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 9/16 inches. Stem diameter, .340 inch. Stem length, 5 $\frac{1}{2}$ inches (top of seat to end of stem). Valve lift, .3125 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (hot). Inlet valves open at top dead center and close 40 degrees after lower dead center. The flywheel is marked 'INTAKE OPEN' and 'TOP DC 1&8' at point of inlet opening.

EXHAUST VALVES:—Head diameter, 1 15/32 inches. Stem diameter, .340 inch. Stem length, 5 $\frac{1}{2}$ inches (top of seat to end of stem). Valve life, .3175 inch. Spring pressure, 50-55 pounds (valve closed). Tappet clearance, .010 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked 'EXHAUST CLOSED 1&8' at point of exhaust closing. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model 725-K.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 100 R.P.M. drawing 250 amperes at 4.75 volts. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5200	5.6	60
3.6 "	1368	4.9	218
15.5 "	Lock	3.2	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and remove nuts on three flange mounting studs. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles of operation. The drive end bearing is oilless.

GENERATOR:—**Model 957-B.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165° F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed lock screw on the outside of the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.7 volts reached at 1600 R.P.M. or 34 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
18-20	8.5	1300	10-12

Shunt field current is 4-6.1 amperes at 6 volts. There is a six ampere field fuse mounted on the end plate which is connected in the field circuit. Brush spring tension is 16-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the right of the engine and is driven through a flexible hose coupling from an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—**Model 265-B.** Relay is mounted on the generator. Relay closes at 550 R.P.M. when the voltage of the generator reaches 7-7.4 volts and opens with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—**Briggs & Stratton Switch Model 50239.** Lighting switch is mounted at lower end of steering column. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 87. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

FUSES:—Generator field fuse is 6 ampere capacity. Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

GRAHAM

CUSTOM EIGHT (1930)

PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-17, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22.5 hours. Battery is mounted under the right front seat.

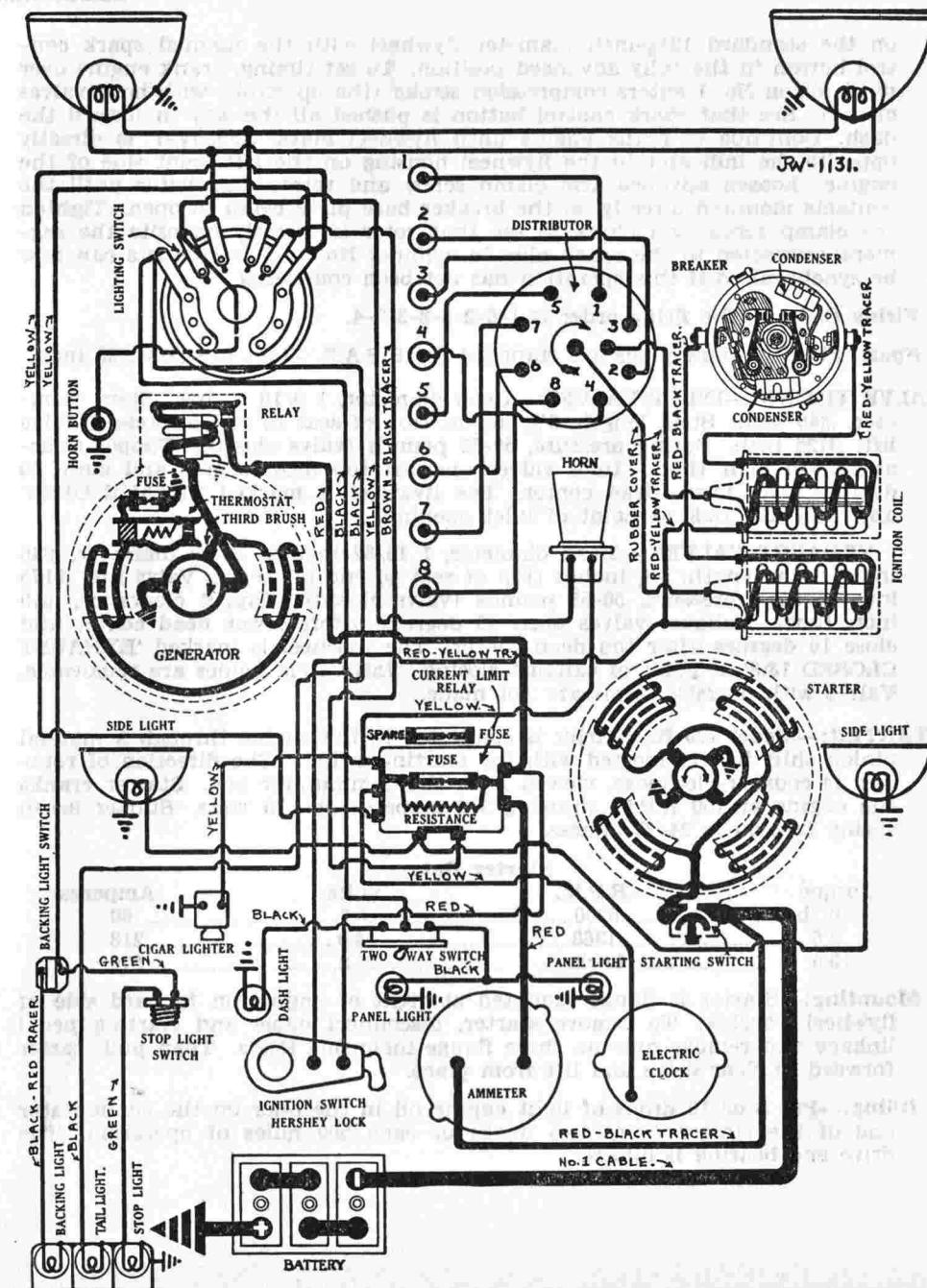
IGNITION:—Coil Model 528-C (2 used). Coils are mounted on the rear of the dash. Ignition current is 3.6 amperes at 6 volts with engine running and 8 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

Distributor Model 668-D. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind contacts and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. It is designed to operate under all normal conditions with the manual spark control in the fully advanced position (with the spark control button pushed all the way in toward the dash). Pulling out the button provides an auxiliary retard for starting. Maximum manual advance is 15 degrees (distributor). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 2600 R.P.M. of engine. There are two sets of contacts operating on a four sided cam. Each set of contacts controls one ignition coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for correct performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary leads and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place. The distributor can be removed without disturbing timing if the advance arm is left clamped to the distributor and the spark control wire is disconnected and the hold-down screw in the advance arm is taken out. Distributor is driven through an offset tongue and slot coupling. This makes it impossible to mount the distributor incorrectly if the tongue is properly engaged in the slot.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and saturate the wick in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Contacts must be synchronized so that the set mounted on the movable sub-base in the distributor housing begin to open at a point exactly 45 degrees after the first set which are mounted directly on the distributor base plate. To synchronize contacts, use special Delco-Remy tool, Part No. 1835009, and follow directions given in the Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking the engine over exactly 90 degrees when piston No. 6 will reach the firing position. If the second set of contacts do not begin to open at this point, loosen the lock screws on the movable sub-base and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If it is outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.



GRAHAM
CUSTOM EIGHT (1930)
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 4 degrees on the flywheel before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston enters compression stroke (the up stroke with both valves closed). See that spark control button is pushed all the way in toward the dash. Continue to turn engine over until the piston reaches a position 4 degrees before top dead center when the 'Spark Full Advance' mark on the flywheel will be directly opposite the indicator in the front of the flywheel case at the right of the engine. Then loosen the advance arm clamp screw and rotate the distributor until the contacts begin to open. Tighten the clamp screw and check to see that the terminal directly opposite the rotor contact which is connected to the center terminal in the distributor head is connected to the spark plug in cylinder No. 1. The remaining spark plugs should be connected in order 3-2-4-8-6-7-5 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are standard 18MM. Metric. Gaps are .023-.025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{5}{8}$ inches. Stem diameter, .340 inch. Stem length, 5 7/16 inches (top of seat to end of stem). Valve lift, .370 inch. Spring pressure, 40-46 pounds (valve closed). Tappet clearance, .008 inch (hot). Inlet valves open 2 degrees after top dead center and close 47 degrees after lower dead center. The flywheel is marked 'EXH.—CLOSES,1&8' at the point of inlet opening and exhaust closing.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, .340 inch. Stem length, 5 7/16 inches (top of seat to end of stem). Valve lift, .370 inch. Spring pressure, 40-46 pounds (valve closed). Tappet clearance, .008 inch (hot). Exhaust valves open 43 degrees before lower dead center and close 2 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 725-G. Starter is connected to the engine through a manual pinion shift interconnected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 90 R.P.M. drawing 150-200 amperes. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	.5.....	60.....
16 "	Lock.....	3.2.....	600.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and remove nuts on three flange mounting studs. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every two weeks or each 500 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 957-C. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the commutator end plate. Then shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.7 volts reached at 1425 R.P.M. or 25 M.P.H.

Generator Data			
Cold Test		Hot Test	
Ampères	Volts	R.P.M.	Volts
18-20.....	8.5.....	1300.....	10-12..... 7.7..... 1300-1500.....

Shunt field current is 4-6.1 amperes at 6 volts. There is a 6 ampere field fuse mounted on the end plate. Brush spring tension is 16-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the left of the engine and is driven through a flexible hose coupling from an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 550 R.P.M. when the generator voltage reaches 7-7.4 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contact closed.

LIGHTING:—Briggs & Stratton Switch Model 50239. Lighting switch is mounted at the lower end of the steering column. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

FUSES:—Generator field fuse is 6 ampere capacity. Lighting fuse mounted on the fuse block on the dash is 20 ampere capacity.

HUDSON

GREAT EIGHT (1930) SERIAL NUMBERS 893,402 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—Exide, Type 3-XI-13-1G, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted under the left front seat.

IGNITION:—Coil Model CE-4012. Coil is mounted on the front of the engine block. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped. The ignition switch is a Model 9-B Electrolock.

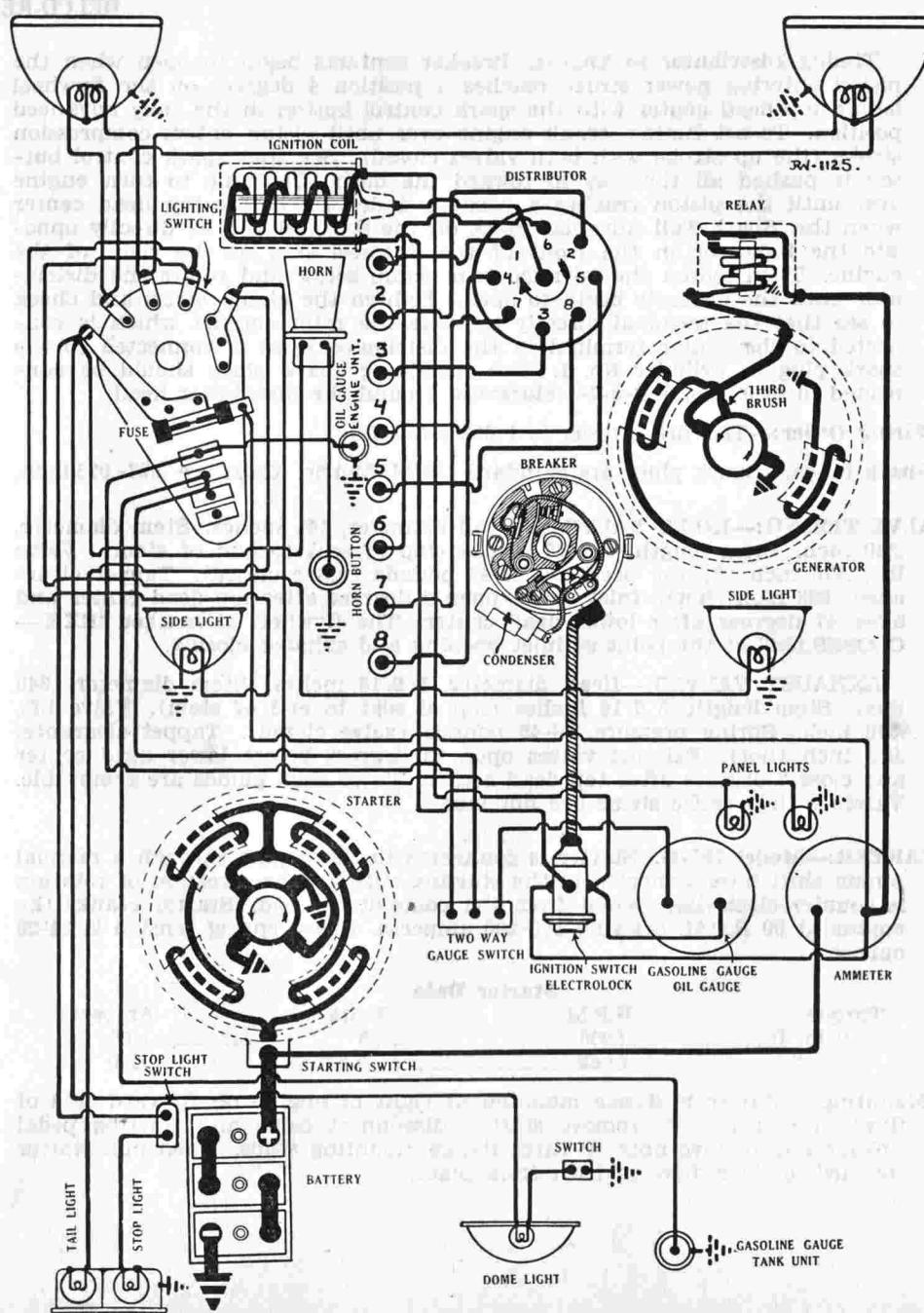
Distributor Model IGH-4009. Breaker contacts separate .020 inch. Set contact gap (first set mounted on stationary base plate) by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. The second set of contacts (mounted on movable sub-plate) are adjusted by loosening lock nut on stationary contact mounting stud and turning up stud to secure correct adjustment. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic. Maximum automatic advance is 10 degrees. There are two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. The contacts must be synchronized for correct ignition performance. See Timing.

Mounting:—Distributor is mounted on the accessory drive bracket at the right of the engine. An Electrolock is used. This must be removed with the distributor as a unit. To remove distributor, first loosen Electrolock from dash mounting. Take off primary lead and remove distributor head with cables intact. Then remove hold-down screw in advance arm and lift distributor from place. See full directions in Equipment Section on removing Electrolock from distributor.

Oiling:—Fill the oiler on the side of the distributor shaft with light engine oil every 2000 miles. At the same time remove the distributor head and rotor and put a few drops of oil on each of the breaker arm pivot pins and coat the face of the breaker cam with a light film of vaseline or light cup grease.

Timing:—**Synchronization of Contacts.** Full directions on synchronization of contacts will be found in Equipment Section listed under 'Auto-Lite Distributors.' The contacts can be synchronized without special equipment after the distributor has been timed to the engine by cranking the engine over 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position and the flywheel mark 'DC 3&6' will be opposite the indicator in the inspection hole in the flywheel case. If the second set of contacts do not begin to open at this point, loosen the two lock screws on the movable sub-plate and shift the plate until the contacts begin to open. Tighten the lock screws and check the contact gap. It must be within limits of .020-.024 inch with breaker arm on lobe of cam.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the breaker assembly fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke. This can be checked by noting valve tappet positions (both valves should be closed) or by removing the spark plug in cylinder No. 1 and cranking engine over until compression is felt when a finger is placed over the spark plug port. Loosen hold-down screw in advance arm and rotate distributor clockwise as far as possible. Then continue to crank engine over until flywheel mark 'DC 1&8' is in line with the



HUDSON

GREAT EIGHT (1930) SERIAL NUMBERS 893,402 UP AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

indicator in the inspection hole in the front face of the flywheel housing on the right side of the engine. Then loosen advance arm clamp bolt and rotate distributor housing until the set of contacts mounted on the base plate begin to open. Tighten the clamp bolt and check to see that the segment directly opposite the rotor in the distributor head is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

After setting ignition the car should be given a road test and the setting changed slightly to give the best performance. A slight spark knock should be audible when the car is accelerated from fifteen to twenty-five miles per hour with wide open throttle for the best performance. If the knock is too noticeable, loosen the advance arm hold-down screw and retard the spark one division on the scale by rotating the distributor in a clockwise direction. If no knock is heard the spark should be advanced by turning the distributor one division counter-clockwise. Give the car a final road test.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .020-.022 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, .3085 inch. Stem length, 5 1/16 inches. Valve lift, .312 inch. Spring pressure, 50 pounds (valve closed). Tappet clearance, .003-.005 inch (hot).

EXHAUST VALVES:—Head diameter, 1¾ inches. Stem diameter, .3085 inch. Stem length, 5 1/16 inches. Valve lift, .327 inch. Spring pressure, 50 pounds (valve closed). Tappet clearance, .005-.007 inch (hot).

Valve Timing:—To check valve timing, first set inlet valve tappet clearance for cylinder No. 1 at proper figure and then turn engine over until the inlet opening mark 'IO' which is slightly past the top dead center mark 'UDC 1&8' is directly in line with the pointer in the inspection hole in the front face of the flywheel housing at the right of the engine. The tappet clearance should be entirely taken up at this point and No. 1 inlet valve should be beginning to open. To set valve timing, install the timing chain so that there are 21 links between the mark on the crankshaft sprocket and the camshaft sprocket with piston No. 1 on top dead center.

STARTER:—Model MAD-4101, MAD-4108. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 125 R.P.M. drawing 125 amperes at 5.5 volts. Brush spring tension is 28-36 ounces. The starting switch is mounted on the starter field frame and is operated by a flexible control on the dash.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	Free.....	650
.3 "	2750.....	5.5100
2.8 "	1360.....	5.0200
5.7 "	800.....	4.5300
8.7 "	400.....	4.0400
15.2 "	Lock.....	3.6760

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and ammeter lead and starting switch control. Then take out three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAM-4102. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, loosen the commutator cover band and shift the third brush by prying on the brush mounting plate with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting plate and the end plate. With standard car setting, the maximum charging rate is 14-16 amperes (cold) at 8 volts reached at 1900 R.P.M. or 27 miles per hour.

Generator Data		
Amperes	Volts	R.P.M.
0.....	6.5.....	620.....
2.....	6.9.....	710.....
5.....	7.1.....	830.....
10.....	7.8.....	1090.....
14.....	7.9.....	1490.....
15.....	8.0.....	1900.....

Shunt field current is 6.5 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts. Brush spring tension is 20-24 ounces.

Mounting:—Generator is cradle mounted at right of engine and is driven through a flexible hose coupling from the accessory drive shaft. To remove generator, disconnect lead and drive coupling and loosen mounting clamp band. Then slide generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 1000 miles.

RELAY:—Model CB-4016. Relay is mounted on the generator end plate. Relay closes at 900 R.P.M. when the generator voltage reaches 7 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Soreng-Manegold Lighting Switch. Lighting switch is mounted at the base of the steering column. The junction block is incorporated with the lighting switch. Headlights are equipped with double filament bulbs and use the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking or side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuse mounted on junction block on switch is 20 ampere capacity.

H U P M O B I L E
SIX CYLINDER MODEL S (1930)
SERIAL NUMBERS S-5001 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type WSB-13, 6 volt, 100 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under the left front seat.

IGNITION:—Coil Model IG-4080. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. The ignition switch is an Electrolock Type 9-B. The Electrolock must be removed with the distributor as a unit whenever the distributor is taken off the car.

Distributor Model IGC-4028. Breaker contacts separate .018-.022 inch. To set contact gap, loosen the locknut on the stationary contact mounting stud and turn up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic with an auxiliary retard for starting. The retard is controlled by a button on the dash. For ordinary operation the control button should be in the fully advanced position (pushed all the way in toward the dash). Automatic advance begins at 1000 R.P.M. of engine. Maximum automatic advance is 16 degrees (engine) reached at 3600 R.P.M.

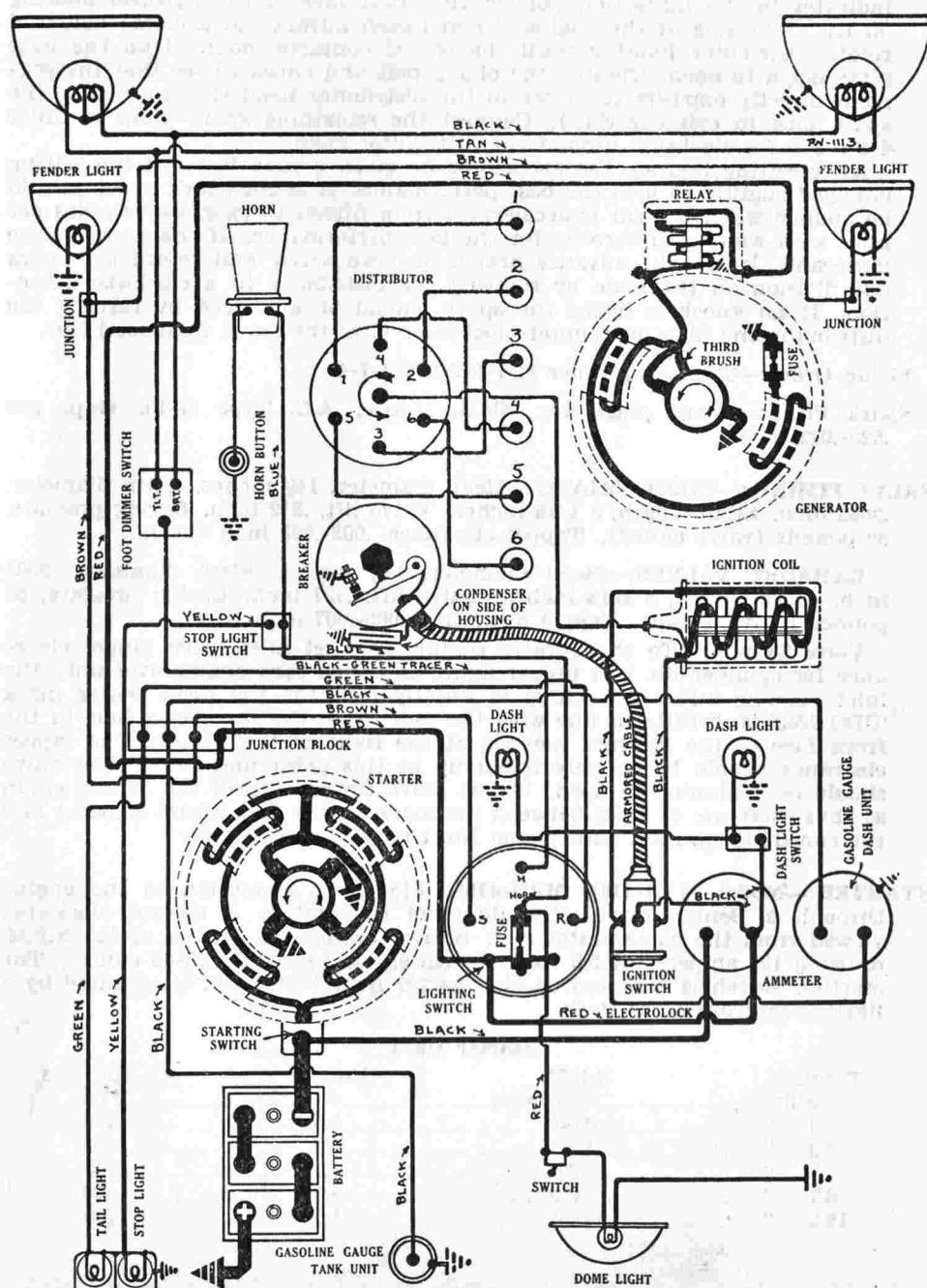
Mounting:—Distributor is mounted at left of engine and is driven by a slanting shaft from the camshaft. The oil pump is mounted on the opposite end of this shaft. The Electrolock ignition switch must be removed as a unit with the distributor. Full directions on removing Electrolock from distributor after distributor has been taken off the car will be found in the Equipment Section. To remove distributor, disconnect Electrolock at dash and remove distributor head with high tension cables intact. Then take out mounting screw and lift distributor from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put a drop of oil on the breaker arm pivot pin and place a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches top dead center. To set timing, crank engine over until piston piston No. 1 enters compression stroke (the up stroke with both valves closed). See that spark control button is pushed all the way in toward the dash. Continue to crank engine over until piston No. 1 reaches top dead center when the flywheel mark 'D.C./1-6' will be in line with the finished bosses on the face of the clutch housing. Then loosen advance arm clamp bolt and rotate distributor until the contacts begin to open. Tighten the clamp bolt and check to see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025-.028 inch.



H U P M O B I L E
SIX CYLINDER MODEL S (1930)
SERIAL NUMBERS S-5001 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, .366 inch. Stem length, 4 59/64 inches. Valve lift, 5/16 inch. Tappet clearance, .008 inch (hot). Inlet valves open 4 degrees after top dead center and close 51 degrees after lower dead center. A two degree variation in the opening and closing point of the valves is allowable.

EXHAUST VALVES:—Head diameter, 1 17/32 inches. Stem diameter, .366 inch. Stem length, 4 59/64 inches. Valve lift, 5/16 inch. Tappet clearance, .008 inch (hot). Exhaust valves open 47 degrees before lower dead center and close at top dead center. The top dead center position of cylinders Nos. 1 and 6 is marked on the flywheel. Valve stem guides are removable. Valves with oversize stems are made in regular sizes of .002, .004 and .008 inch oversize. Valves are also made .002 inch oversize with a .024 inch oversize head.

STARTER:—Model MAC-4221. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starter switch is Model MU-2208. It is mounted on the starter field frame and is operated through a flexible control from a button on the dash.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	3000-5000.....	6.....	50.....
3 "	1350	5	200
5.5 "	900	4.5	300
13.5 "	Lock	3	550

Mounting:—Starter is flange mounted at the left of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and starting switch control wire and take out mounting screws in two flange mounting holes. Then pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4124. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting plate with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate are held in position by friction between the mounting plate stud and the generator end plate. With standard car setting, the maximum charging rate is 16-17 amperes at 8 volts reached at 1900 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0.....	6.2.....	600.....
8.....	7.1.....	900.....
17.....	8.0.....	1900.....
12.....	7.7.....	3200.....

Brush spring tension is 24-32 ounces. Shunt field current is 4.5 amperes at 6 volts. Generator motoring draws 4.75 amperes at 6 volts. There is a five ampere field fuse mounted on the end plate.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and back off timing chain adjustment set screw. Then take out flange mounting cap screws and pull generator to the rear, being careful not to disturb timing chain.

Timing Chain Adjustment. The timing chain should be adjusted at the end of the first 1000 miles and checked after every 5000 miles of operation. To adjust timing chain, loosen the three flange mounting screws and turn up the adjustment set screw with the engine running until the chain begins to hum. Back off the set screw until the chain runs noiselessly and tighten the mounting screws.

Oiling:—Put 4 or 5 drops of light engine oil in the generator bearing oiler every two weeks or each 500 miles of operation.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay closes at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and opens when the discharge current reaches .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch. Dimmer Switch Model 5825. Lighting switch is mounted on the dash and is controlled by a push button on the face of the instrument panel. The control knob should be pulled out to operate the switch. Headlights are double filament using the second 21 cp. filament instead of dimmers. The headlight circuit is controlled by a switch mounted on the toeboard. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuse on switch is 20 ampere capacity. A spare fuse is also mounted on the switch.

HUMMOBILE
EIGHT CYLINDER MODEL C (1930)
SERIAL NUMBERS C-5001 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt, 120 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under the left front seat.

IGNITION:—Coil Model CE-4001. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. The ignition switch is an Electrolock Type 5-A. The Electrolock must be removed with the distributor as a unit whenever the distributor is taken off the car. Full details covering the Electrolock will be found in the Equipment Section.

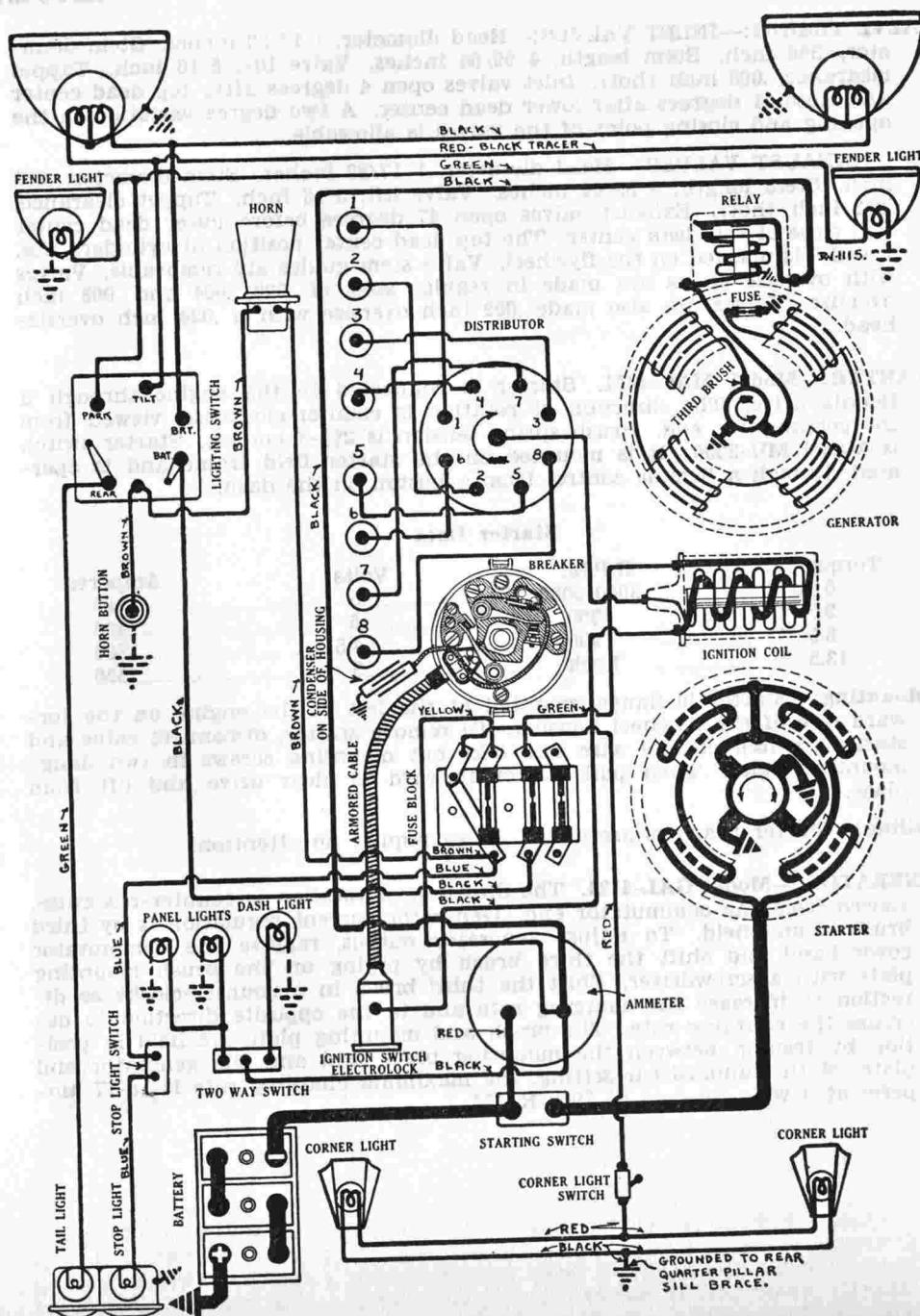
Distributor Model IGH-4008-C. Breaker contacts separate .020-.022 inch. Set contact gap (first set mounted on stationary base plate) by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. The second set of contacts (mounted on movable sub-plate) are adjusted by loosening lock nut on stationary contact mounting stud and turning up stud. Resurface contacts with a fine file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is full automatic with an auxiliary retard for starting. This is controlled by a button on the dash. The normal running position is with the button pushed all the way in toward the dash (fully advanced). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 16 degrees (engine) reached at 3600 R.P.M. of engine. Distributor has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. The contacts must be synchronized to insure the correct interval for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, first disconnect Electrolock at dash and remove distributor head with cables intact. Then disconnect manual spark control and take out hold-down screw in advance arm. Lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put a drop of oil on each of the breaker arm pivot pins and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Full directions on synchronizing contacts will be found in Equipment Section listed under 'Auto-Lite Distributors.' Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees from firing position of piston No. 8 when piston No. 5 will reach firing position. If the second set of contacts do not begin to open at this point, loosen the two lock screws on the movable sub-plate on which contacts are mounted and shift plate until contacts open. Tighten the lock screws and check the contact gap.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control button in the fully retarded position (pulled out from the dash). To set timing, crank engine over until piston No. 8 enters compression stroke (the up stroke with both valves closed). Fully retard the spark control button. Continue to crank engine over until the flywheel mark '1&8'



H U P M O B I L E

EIGHT CYLINDER MODEL C (1930)

SERIAL NUMBERS C-5001 UP

AUTO-LITE GENERATING, STARTING SYSTEM

AUTO-LITE IGNITION

(on the front of the flywheel at the right of the engine) is in line with the indicator on the flywheel housing. If the breaker contacts are not beginning to open, loosen advance arm clamp screw and rotate distributor until contacts open. Tighten the clamp screw and check to see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 8. Connect the remaining spark plugs in order 5-2-6-1-4-7-3 clockwise around the distributor head. There is a mark on the flywheel 9 degrees or 1 inch before the dead center mark '1&8' to indicate the firing position with the spark control button in the fully advanced position. This mark can be used in timing the engine if the spark control button is advanced, which will rotate the distributor counter-clockwise to the limit of the advance arm slot.

Firing Order:—The firing order is 1-4-7-3-8-5-2-6.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion No. 8. Gaps are .028-.030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, 11/32 inch. Stem length, 5 13/16 inches. Valve lift, 11/32 inch. Tappet clearance, .007 inch (hot). Inlet valves open 1 degree after top dead center and close 51 degrees after lower dead center. The allowable variation is plus or minus 2 degrees for valve opening and plus 6 or minus 0 degrees for valve closing.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, 11/32 inch. Stem length, 5 13/16 inches. Valve lift, 11/32 inch. Tappet clearance, .014-.015 inch (hot). Exhaust valves open 47 degrees before lower dead center and close 3 degrees after top dead center. The allowable variation is plus 0 or minus 6 degrees for valve opening and plus 6 or minus 0 degrees for valve closing. Valve stem guides are removable. Valves with oversize stems are made in regular sizes of .002, .004 and .008 inch oversize. Valves are also made with .002 inch oversize stem and .024 inch oversize head.

NOTE.—To set valve timing, tappet clearance of No. 1 inlet valve should be set at .010 inch and No. 1 exhaust valve at .020 inch. There should be 14 links of the timing chain between the marks on the camshaft sprocket and the crankshaft sprocket.

STARTER:—Model MAB-4021. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starter switch is Model SW-4001.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3000	.6	50
3.5 "	1100	.5	200
6.5 "	700	4.5	300
17 "	Lock	.3	530

Mounting:—Starter is sleeve mounted at right of engine on rear of flywheel housing. To remove starter, take up floor boards in front compartment, disconnect cable and take out large pilot mounting screw in flywheel housing directly above starter sleeve. Then pull starter to the rear to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAG-4118. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove commutator cover band and shift third brush by prying on brush mounting plate with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate are held in any position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate of 15-17 amperes is reached at 1400 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0	6.3	580
8	7.2	820
16	8.0	1400
12	7.6	2150

A five ampere field fuse is connected in the field circuit. Brush spring tension is 16-24 ounces. Shunt field current is 4.5 amperes at 6 volts. Generator motoring draws 4.7 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and back off generator timing chain adjustment set screw. Take out three flange mounting cap screws. Then pull generator to the rear and tie up timing chain to prevent it slipping on camshaft sprocket.

Timing Chain Adjustment. Timing chain is adjusted by shifting generator. This adjustment should be made after the first 100 miles and checked after every 5000 miles of operation. To adjust timing chain, loosen the three flange mounting screws and turn up the adjustment set screw until the chain begins to hum with the engine running. Then back off the set screw until the chain runs noiselessly and tighten the mounting screws.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles of operation. The drive end bearing is oiled from the chain case.

RELAY:—Model CB-4012. Relay is mounted on the generator. Relay closes at 625 R.P.M. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Clum Switch Model 9022. Lighting switch is mounted at the base of the steering column. Headlights are equipped with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuses mounted on block on dash (left side, under hood) are 15 ampere capacity.

H U P M O B I L E
EIGHT CYLINDER MODELS H AND U (1930)
SERIAL NUMBERS H-5001 UP
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type SJRR-5, 6 volt, 130 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 145 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted under the left front seat.

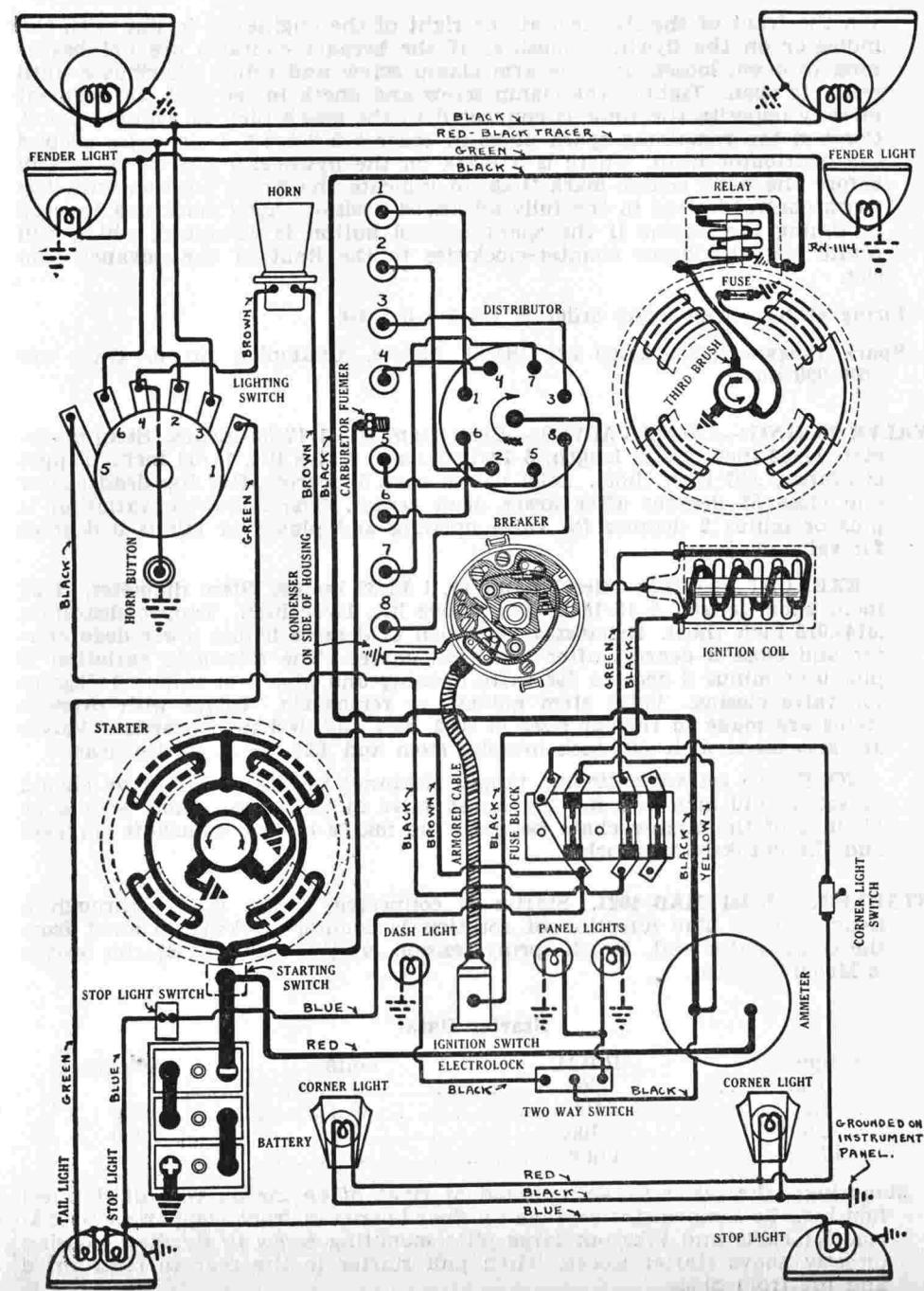
IGNITION:—Coil Model CE-4001. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. The ignition switch is an Electrolock Type 5-A. The Electrolock must be removed with the distributor as a unit whenever the distributor is taken off the car.

Distributor Model IGH-4008-C. Breaker contacts separate .020-.022 inch. Set contact gap (first set mounted on stationary base plate) by loosening lock screws on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. The second set of contacts (mounted on movable sub-plate) are adjusted by loosening lock nut on stationary contact mounting stud and turning up stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is of full automatic type with an auxiliary retard for starting controlled by a button on the dash. The normal running position is with the spark control button pushed all the way in toward the dash (the fully advanced position). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 16 degrees (engine) reached at 3600 R.P.M. of engine. Distributor has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. The contacts must be synchronized to secure the exact firing interval for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and can be removed from the right side. To remove distributor, first disconnect Electrolock at the dash and remove the distributor head with cables intact. Then disconnect spark control wire and take out hold-down screw in advance arm. Lift distributor from place and remove distributor and Electrolock as a unit. For complete instructions on the Electrolock see Equipment Section.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put one drop of oil on the breaker arm pivot pins and put a small bit of vaseline on the face of the breaker cam.

Timing:—Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control button in the fully retarded position. To set timing, crank engine over until piston No. 8 enters compression stroke (the up stroke with both valves closed). Fully retard spark control button by pulling the button away from the dash until the distributor is rotated clockwise the full length of the advance arm slot. Then crank engine over until piston reaches top dead center when the flywheel mark '1&8' (on the front of the flywheel at the right of the engine) will be directly in line with the mark on the flywheel housing. Loosen the advance arm clamp screw and rotate the distributor until the contacts mounted on the stationary base plate begin to open. Tighten the clamp screw and see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 8. Connect the remaining spark plugs in order 5-2-6-1-4-7-3 clockwise around the distributor head. There is a mark 9 degrees or one inch on the flywheel before



H U P M O B I L E

EIGHT CYLINDER MODELS H AND U (1930)
 SERIAL NUMBERS H-5001 UP
 AUTO-LITE GENERATING, STARTING SYSTEM
 AUTO-LITE IGNITION

the dead center mark which can be used to time the engine with the spark control button fully advanced. If this mark is used, see that the spark control button is pushed all the way in toward the dash and that the distributor is rotated counter-clockwise to the full extent of the timing arm slot.

Synchronization of Contacts. Synchronize contacts on a rotary spark gap or use special Auto-Lite tool and follow complete directions in Equipment Section. Contacts can be synchronized after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 5 will reach firing position (top dead center with manual spark control fully retarded). If the second set of contacts do not begin to open at this point, loosen the two lock screws on the movable sub-plate and shift plate until contacts begin to open. Tighten the lock screws and check the contact gap.

Firing Order:—The firing order is 1-4-7-3-8-5-2-6.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion No. 8. Gaps are .028-.030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.745 inches. Stem diameter, .3405 inch. Stem length, 6 13/16 inches. Valve lift, 11/32 inch. Tappet clearance, .007 inch (hot). Inlet valves open 1 degree after top dead center and close 51 degrees after lower dead center. The allowable variation is plus 0 or minus 6 degrees for valve opening and plus 6 or minus 0 degrees for closing.

EXHAUST VALVES:—Head diameter, 1.590 inches. Stem diameter, .3405 inch. Stem length, 6 13/16 inches. Valve lift, 11/32 inch. Tappet clearance, .014-.015 inch. Exhaust valves open 47 degrees before lower dead center and close 3 degrees after top dead center. The allowable variation is plus 0 or minus 6 degrees for valve opening and plus 6 or minus 0 degrees for closing. Valve stem guides are removable. Valves with oversize stems are made in regular .002, .004 and .008 inch oversizes. Valves are also made with .002 inch oversize stem and .024 inch oversize head.

NOTE:—In setting valve timing, the tappet clearance of No. 1 inlet valve should be set at .010 inch and No. 1 exhaust valve at .020 inch. There should be 11 links in the timing chain between the marks on the camshaft sprocket and the crankshaft sprocket.

STARTER:—Model MR-4102. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starting switch is Model SW-2725. It is mounted on the starter field frame. There is a terminal on the starter for the carburetor fuemer connection.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	Free.....	5.8.....	70.....
6 " "	680.....	5.4.....	200.....
11.5 " "	450.....	5.0.....	300.....
33.0 " "	Lock.....	3.0.....	640.....

Mounting:—Starter is sleeve mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and fuemer lead and starting pedal linkage. Then remove large pilot mounting screw in flywheel housing directly above starter sleeve. Pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the drive end of the starter every two weeks or each 500 miles of operation.

GENERATOR:—Model GAG-4118. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by prying on the mounting plate with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 15-17 amperes at 8 volts reached at 1400 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
0.....	.6.3.....	580.....
8.....	7.2.....	820.....
16.....	8.0.....	1400.....
12.....	7.6.....	2150.....

A 5 ampere field fuse is connected in the field circuit. Generator brush spring tension is 16-24 ounces. Shunt field current is 4.5 amperes at 6 volts. Generator motoring draws 4.7 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and back off chain adjustment set screw. Then take out three flange mounting screws and pull generator to the rear. Tie up the timing chain to prevent chain slipping on camshaft sprocket.

Timing Chain Adjustment. Timing chain is adjusted by shifting generator. The timing chain should be taken up after the first 100 miles and should be checked every 5000 miles. To adjust chain, loosen three flange mounting screws and turn up adjustment set screw until chain begins to hum with engine running at equivalent of 25 miles per hour. Back off set screw until chain runs noiselessly and tighten mounting screws.

RELAY:—Model CB-4012. Relay is mounted on the generator. Relay closes at 625 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 5.2-5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—**Soreng-Manegold Switch.** Lighting switch is mounted at base of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuses mounted on fuse block (left side, under hood) are 15 ampere capacity.

JORDAN

SERIES 70 (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The negative terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model IG-4078. Ignition coil is mounted on the dash. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

Distributor Model IGH-4005-A. Breaker contacts separate .018-.020 inch. Set contact gap by loosening two lock screws on stationary contact mounting plate and turning up eccentric adjusting screw (first set) mounted directly on breaker plate. The second set are adjusted by loosening the lock nut on the stationary contact mounting stud and turning up the stud. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 10 degrees. Maximum automatic advance is 15 degrees. Breaker has two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on rear of generator at right of engine. To remove distributor, disconnect manual spark control and primary lead and remove distributor head with cables intact. Then take out mounting screw in advance arm and lift distributor from place.

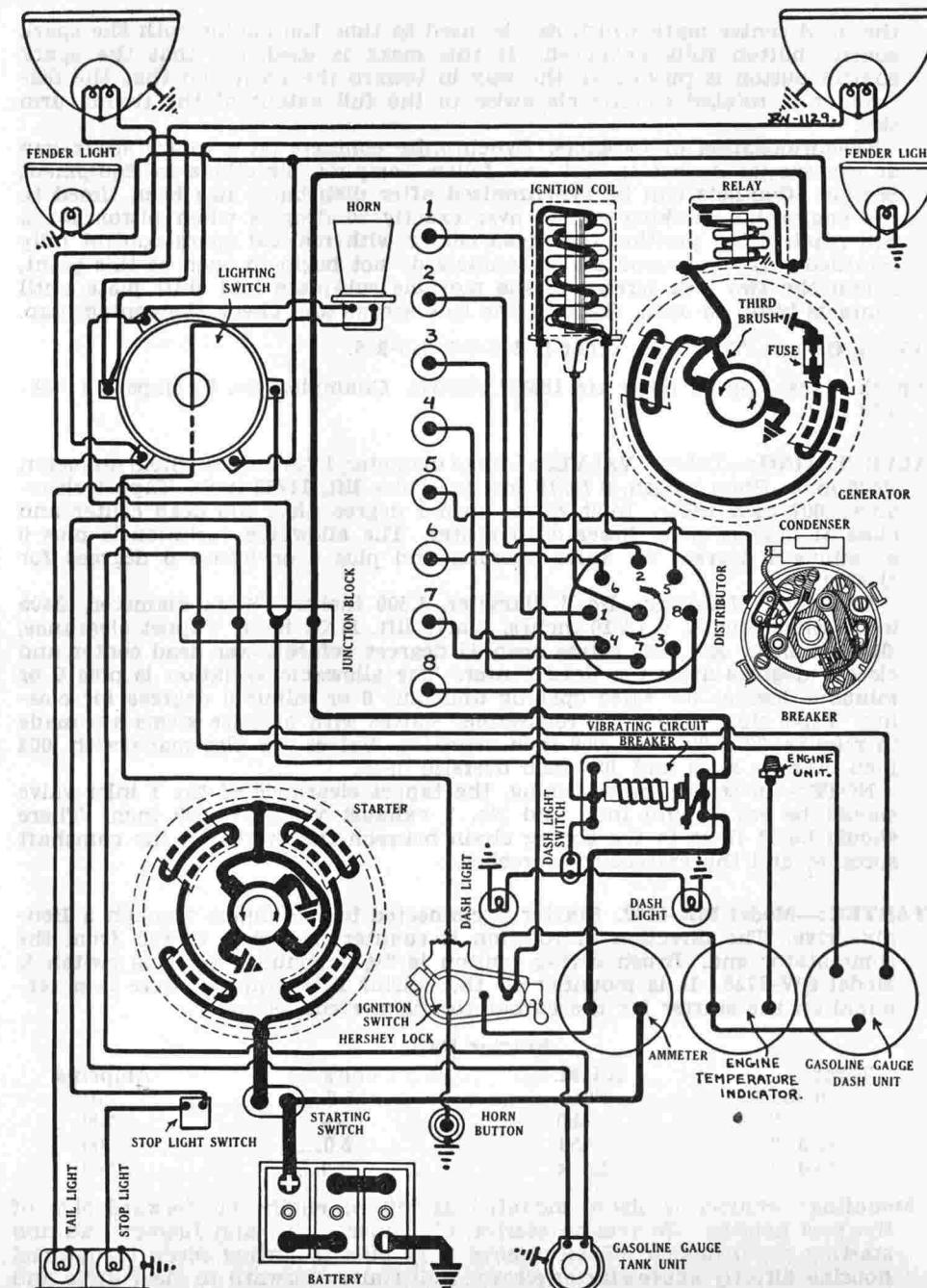
Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor every 500 miles of operation. Every 1000 miles remove the distributor head and rotor and put 3 or 4 drops of oil in the oiler in the center of the shaft and put one drop of oil on the breaker arm pivot pins. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Auto-Lite tool and follow complete directions given in Equipment Section. Contacts can be synchronized after distributor has been timed to the engine by cranking engine over 90 degrees when piston No. 6 will reach firing position ($\frac{1}{8}$ inch on the flywheel before top dead center). If the second set of contacts do not open at this point, loosen the two lock screws and shift the movable sub-plate until contacts begin to open. Tighten the lock screws and check the contact gap.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position .875 inch on the flywheel before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control and turn engine over until the ignition mark 'IGN' on the flywheel which is .875 inch before the top dead center mark 'DC 1&8' is directly opposite the indicator in the inspection hole in the flywheel housing. Then loosen the advance arm clamp screw and rotate the distributor until the first set of contacts begin to open. Tighten the clamp screw and connect the spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .030 inch.



JORDAN

SERIES 70 (1930)

AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{3}{8}$ inches. Stem diameter, 5/16 inch. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .006 inch (hot). Inlet valves open 8 degrees after top dead center and close 50 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{1}{4}$ inches. Stem diameter, 5/16 inch. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .0075 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 8 degrees after top dead center. The flywheel is marked '#1E.C.' at the point of exhaust closing for cylinder No. 1. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model MUA-4007.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 160 R.P.M. Brush spring tension is 24 ounces. Starter switch is Model SW-4002.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4200	6	.50
2 "	1500	5.3	.130
4 "	1000	5.0	.200
6 "	600	4.6	.275
8 "	450	4.2	.340
22 "	Lock	3.6	.480

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—**Model GAL-4126.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and brush mounting plate by prying on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting,

the maximum charging rate is 12 amperes (hot) at 8 volts reached at 1250 R.P.M.

Generator Data

	Amperes	Volts	R.P.M.
0	.62	600	
8	7.1	900	
17	8.0	1900	
12	7.7	3200	

Shunt field current is 4.5 amperes at 6 volts. A five ampere fuse is connected in the field circuit. Generator motoring draws 4.75 amperes at 6 volts. Brush spring tension is 24-32 ounces.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, first disconnect all ignition wiring or remove distributor. Then take out generator mounting screws. Pull generator to the rear to disengage laminated coupling and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the generator every 1000 miles of operation.

RELAY:—**Model CB-4014.** Relay is mounted on the generator. Relay contacts close at 650 R.P.M. when the voltage of the generator reaches 7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—**Soreng Manegold Switch.** Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. depressed beam filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Tail and stop light is 6-8 volt, 3-21 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament.

FUSES:—Generator field fuse is 5 ampere capacity.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the dash is connected in the lighting circuits. Circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 10-15 amperes.

JORDAN

SPEEDWAY SERIES Z (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—Willard, RJ-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted on right frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4065 (2 used). Coils are mounted on the dash. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped (each coil). The ignition switch is an Oakes 'Hershey' type co-incidental steering post and ignition switch lock.

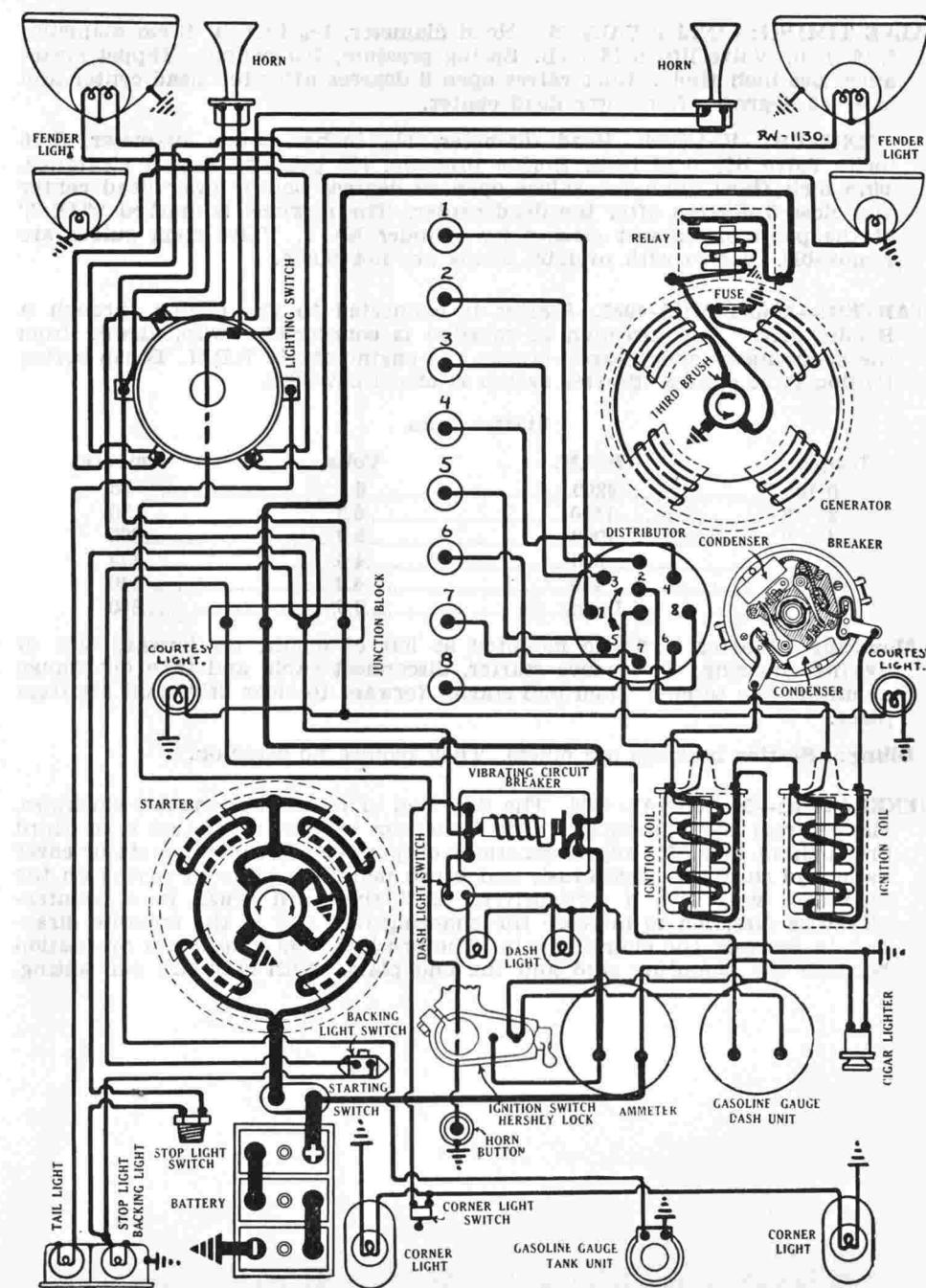
Distributor Model IGD-EO-1164. Breaker contacts separate .018-.020 inch. Set contact gap (first set mounted on breaker plate) by loosening the two lock screws on the stationary contact mounting plate and turning up eccentric adjusting screw until breaker gap is .020 inch with breaker arm on lobe of cam. The second set (mounted on movable sub-plate) are adjusted by loosening the lock nut on the stationary contact mounting stud and turning up the stud. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (distributor). Maximum automatic advance is 15 degrees. Breaker has two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Each set of contacts controls one coil and fires the spark plugs in four cylinders. The firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on commutator end of generator at the right of the engine. To remove distributor, disconnect primary leads and manual advance control and remove distributor head with cables intact. Then take out mounting screw in advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every month or each 1000 miles of operation. At the same time remove the distributor head and rotor and put a drop of oil on the breaker arm pivot pins. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Auto-Lite synchronizing tools and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over 90 degrees when piston No. 6 will reach firing position ($\frac{3}{4}$ inch on the flywheel before top dead center). If the second set of contacts do not begin to open at this point, loosen the two lock screws on the movable sub-plate and shift plate until the contacts begin to open. Tighten the lock screws and check the contact gap.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position .750 inch (on the flywheel) before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance manual spark control and turn engine over until the flywheel mark 'IGN', which is .750 inch before the top dead center mark 'DC #1&8', is directly opposite the indicator in the inspection hole in the flywheel housing. Then loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted directly on breaker plate) begin to open. Tighten the clamp screw and connect spark plugs in order as shown on the diagram.



JORDAN

SPEEDWAY SERIES Z (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{5}{8}$ inches. Stem diameter, 5/16 inch. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .007 inch (hot). Inlet valves open 2 degrees after top dead center and close 47 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, 5/16 inch. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .007 inch (hot). Exhaust valves open 43 degrees before lower dead center and close 2 degrees after top dead center. The flywheel is marked 'Ex.Cl.1&8' at a point .218 inch after the top dead center mark to indicate the exhaust closing point for cylinder No. 1. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model ML-4146. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 160 R.P.M. Brush spring tension is 20-24 ounces. Starter switch is Model SW-4002.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	.55	50
1.1 "	1940	.55	100
4.3 "	1050	.50	200
7.8 "	650	.45	300
11.4 "	350	.35	400
16 "	Lock	.30	560

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out flange mounting screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the starter every month or each 1000 miles of operation.

GENERATOR:—Model GAG-4108. Direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by prying on the mounting stud with a screwdriver. Shift the third brush in a clockwise direction to increase the charging rate and in the opposite direction to decrease the

charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 9-12 amperes at 7.65 volts reached at 1300 R.P.M.

Generator Data

Ampères	Volts	R.P.M.
0.....	6.4.....	475.....
4.....	6.75.....	575.....
8.....	7.1.....	700.....
12.....	7.45.....	850.....
16.....	7.8.....	1050.....
18.....	8.0.....	1300.....

Shunt field current is 3.9-4.4 amperes at 6 volts. A five ampere field fuse is connected in series with the field circuit. Generator motoring draws 4.75-5.25 amperes at 6 volts. Brush spring tension is 24-32 ounces.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, first disconnect all ignition wiring or remove distributor. Then take out generator mounting screws. Pull generator to the rear to disengage the laminated coupling and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the generator oiler every month or each 1000 miles of operation.

RELAY:—Model CB-4012. Relay is mounted on the generator. Relay contacts close at 650 R.P.M. when the voltage of the generator reaches 7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Soreng Manegold Switch. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs using a second 21 cp. depressed beam filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. Mazda 63. Dash, tail, corner and courtesy lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Generator field fuse is 5 ampere capacity.

CIRCUIT BREAKER:—A vibrating circuit breaker mounted on the dash is connected in the lighting circuits. Circuit breaker begins to vibrate when the current in the lighting lines reaches 25-30 amperes limiting the current to 10-15 amperes.

KISSEL
MODEL 6-73 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type CWR-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. The battery is cradle mounted under the front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the dash. Ignition current is .6-1.5 amperes at 6 volts with engine running and 3.4-4.5 amperes at 6 volts with engine stopped.

Distributor Model 640-L. Breaker contacts separate .018-.024 inch with breaker arm on lobe of cam. Set contact gap by loosening lock screw on stationary contact mounting plate (directly behind contacts) and turning up eccentric adjusting screw until correct gap is secured. Resurface contacts when necessary with a fine flat contact file or on a medium hard oil-stone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2200 R.P.M. of engine.

Mounting:—Coil is mounted on the dash. Distributor is mounted on the cylinder head with a SAE Type B mounting. To remove the distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Loosen the hold-down screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivot every 1000 miles. Put a few drops of light engine oil in the wick oiler under the rotor every 2000 miles.

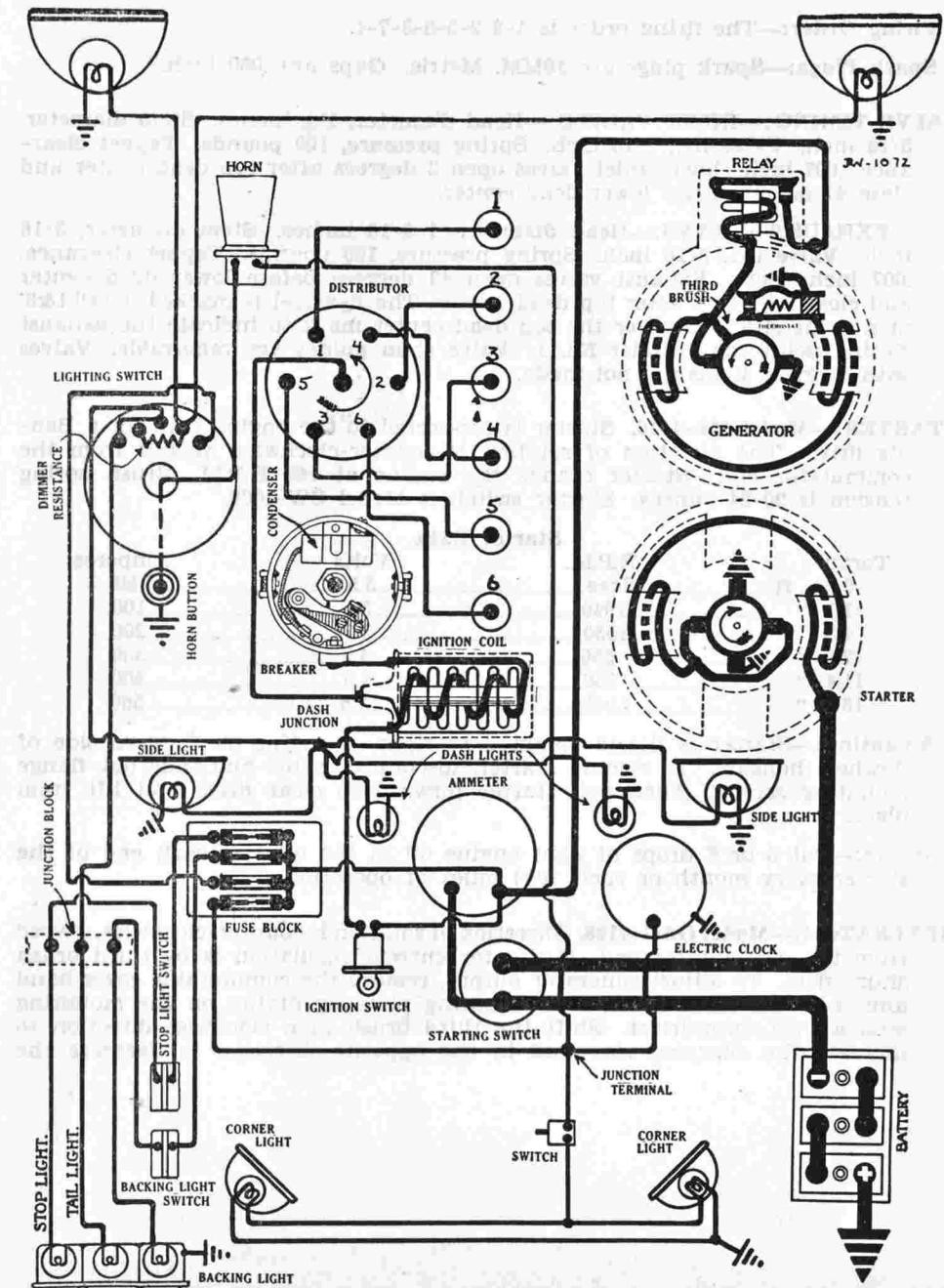
Timing:—Breaker contacts separate when the piston entering power stroke reaches a position 10 degrees after top dead center (measured on the flywheel) with the spark control in the fully retarded position. To check timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank the engine until piston reaches the firing position when the ignition mark '1&6' on the flywheel will be 10 degrees past the indicator on the flywheel housing. Breaker contacts should separate at this point. If they do not, loosen the clamp screw on the side of the distributor mounting and rotate distributor until contacts separate. Tighten the screw. Make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 5-3-6-2-4 around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4. No. 1 cylinder nearest the radiator.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 Long. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, .342 inch. Stem length, 5 15/16 inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Inlet valves open 5 degrees before top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, .342 inch. Stem length, 5 15/16 inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, 11/32 inch. Exhaust valves open at 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.



KISSEL

MODEL 6-73 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
Free	3000	5.0	70
15 lb. ft.	Lock	3.7	450

Mounting:—Starter is mounted with a SAE No. 1 flange mounting on the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 8-10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless and requires no attention. Every six months remove the plug in the reduction gear case and repack the gear compartment with graphite grease.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160 degrees F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data

Amperes	Cold Test		Hot Test		R.P.M.
	Volts	R.P.M.	Amperes	Volts	
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at right of engine on special swinging bracket and is belt driven from the engine crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain the radiator and remove the water pump hose connections. Then take out adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Take out the two bolts mounting the generator on the bracket and lift the generator and water pump from place. The water pump can be removed by taking out the cap screws which mount the pump on the generator bosses.

Belt Adjustment:—To tighten drive belt, loosen the adjustment clamp bolt and swing the generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not tighten the drive belt more than is necessary to secure positive drive without slipping or the belt will crowd the generator bearings.

Oiling:—Put 8-10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch.

LIGHTING:—Clum Switch Model 10677. Switch is mounted at lower end of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and dome lights are 6-8 volt, 3 cp. D.C. Mazda 64. Tail, stop and backing lights are 6-8 volt, 3 cp. S.C. Mazda 63. Corner lights are 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—Fuses are mounted on the dash. They are 10 ampere capacity.

KISSEL
MODEL 8-95 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. The battery is cradle mounted under the front seat.

IGNITION:—Coil Model 528-C. Coil is mounted on the dash. Ignition current is .6-1.5 amperes at 6 volts with engine running and 3.4-4.5 amperes at 6 volts with engine stopped.

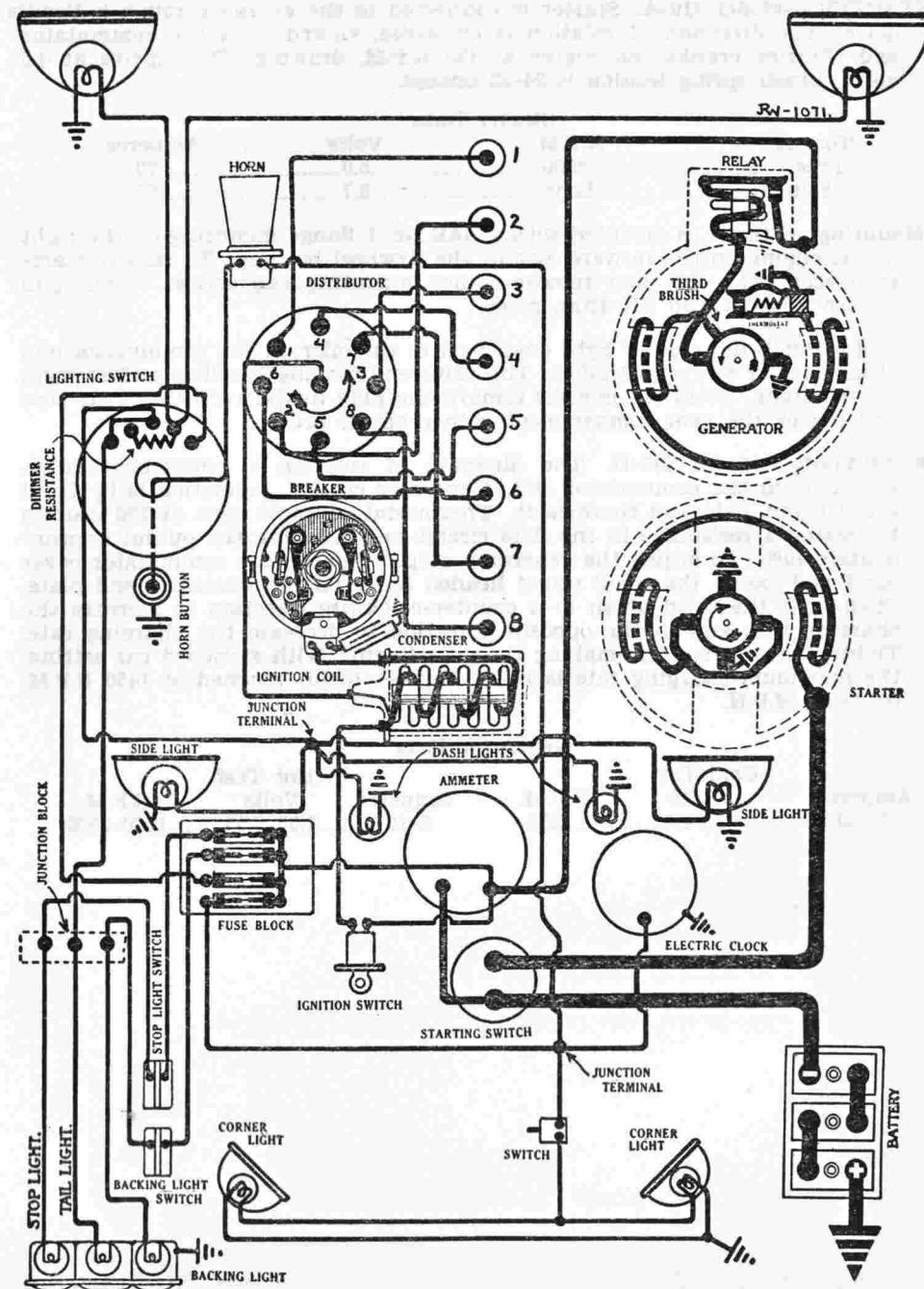
Distributor Model 658-L. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning up eccentric adjusting screw until breaker gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 3000 R.P.M. of engine. Breaker has two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Coil is mounted on the dash. Distributor is mounted on the cylinder head with a SAE Type B mounting. To remove the distributor, disconnect primary lead and manual advance rod. Remove distributor head with high tension cables intact. Loosen mounting stud clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivot every 1000 miles. Put a few drops of light engine oil in the wick oiler under the rotor every 2000 miles.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions given in Equipment Section. Contacts may be synchronized without special equipment after distributor has been timed to the engine by cranking the engine over exactly 90 degrees when piston No. 6 will reach firing position (10 degrees past top dead center with spark retarded). If the second set of contacts are not beginning to open, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts begin to separate when piston entering power stroke reaches a position 10 degrees past top dead center (measured on the flywheel) with the manual advance control in the fully retarded position. To set timing, crank engine over until piston No. 1 is coming up on the compression stroke. This is the up stroke with both valves closed. Fully retard the spark. Continue to crank engine until the ignition mark '1&8' is $\frac{3}{4}$ inch or 10 degrees after top dead center on the flywheel when the mark 'Time' will be opposite the indicator on the flywheel housing. Breaker contacts should separate at this point. If they do not, loosen the advance arm clamp screw and rotate distributor until contacts separate. Tighten the clamp screw and make certain that the rotor is opposite the segment connected to the spark plug in cylinder No. 1 and connect the remaining plugs in order 6-2-5-8-3-7-4 around the distributor head.



KISSEL
MODEL 8-95 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 Long. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $17/32$ inches. Stem diameter, .342 inch. Stem length, 5 $15/16$ inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, $11/32$ inch. Inlet valves open at top dead center and close at 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $13/32$ inches. Stem diameter, .342 inch. Stem length, 5 $15/16$ inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, $11/32$ inch. Exhaust valves open at 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Model 716-A. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
Free	3000	5.0	70
15 lb. ft.	Lock	3.7	450

Mounting:—Starter is mounted with a SAE No. 1 flange mounting on the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 8-10 drops of light engine oil in the oiler on the commutator end of the starter every 1000 miles. The drive end bearing is oilless and requires no attention. Every six months remove the plug in the reduction gear case and repack the gear compartment with graphite grease.

GENERATOR:—Model 955-H. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160 degrees F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting,

the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at right of engine on special swinging bracket and is belt driven from the engine crankshaft. The water pump is mounted directly on the rear of the generator and is driven by the generator shaft. To remove generator, first drain the radiator and remove the water pump hose connections. Then take out adjustment clamp bolt and swing generator toward the engine. Slip off the drive belt. Take out two bolts mounting generator on bracket and lift generator and water pump from the engine.

Belt Adjustment:—To adjust belt tension, loosen the adjustment clamp screw and swing generator away from the engine until the correct belt tension is secured. Tighten the clamp bolt. Do not tighten the drive belt more than is necessary or it will crowd the generator bearings.

Oiling:—Put 8-10 drops of light engine in each of the generator oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch.

LIGHTING:—Clum Switch Model 10677. Switch is mounted at lower end of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, dome and corner lights are 6-8 volt, 3 cp. D.C. Mazda 64. Tail, stop and backing lights are 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Fuses are mounted on the dash. They are 10 ampere capacity.

KISSEL

MODEL 8-126 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. The battery is cradle mounted under the front seat.

IGNITION:—Coil Model 528-C (2 used). Coils are mounted on the dash. Ignition current is 1.2-3 amperes at 6 volts with engine running and 6.8-9 amperes at 6 volts with engine stopped.

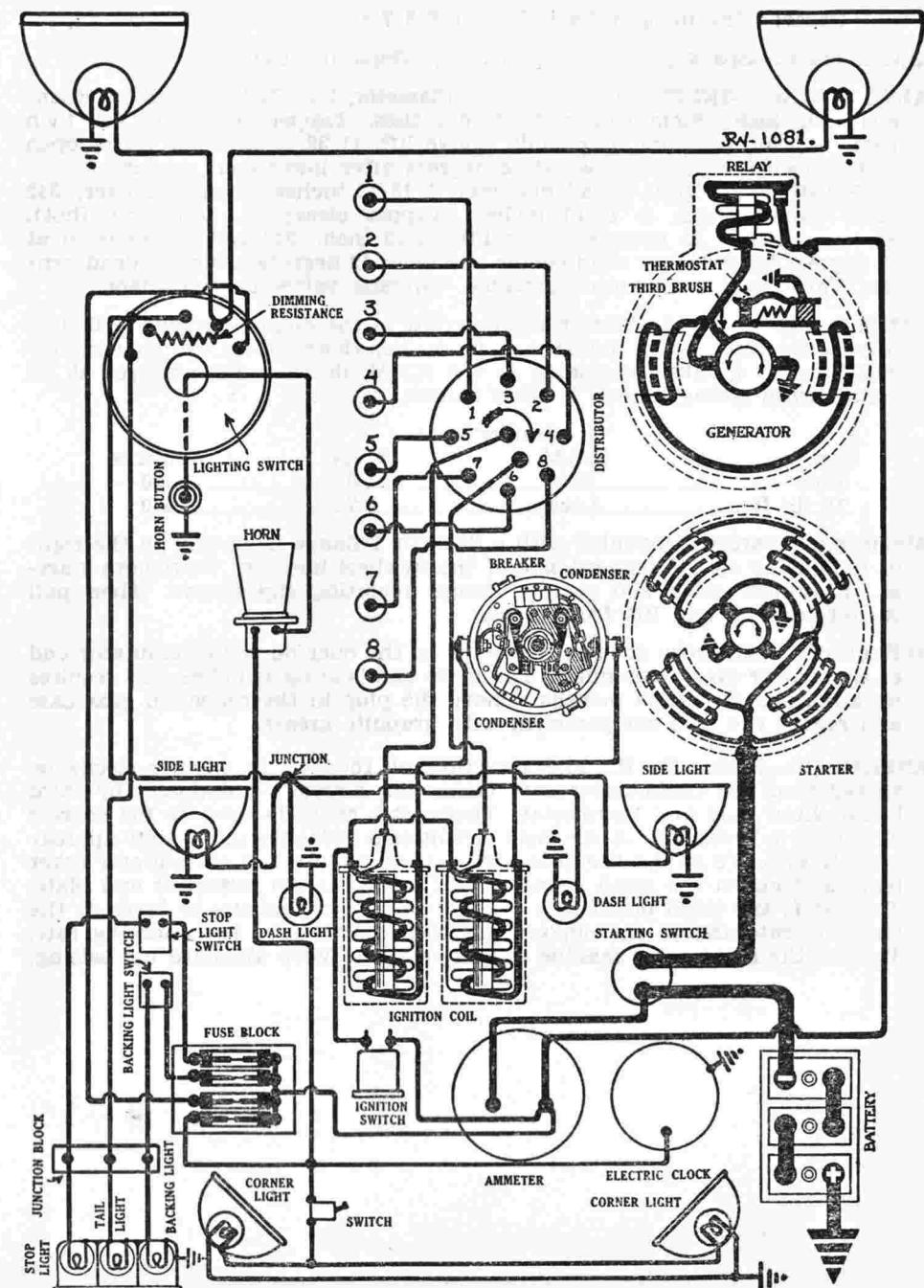
Distributor Model 668-B. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until contact gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 15 degrees reached at 4200 R.P.M. of engine. Breaker has two sets of contacts operating on a single four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head by an S.A.E. Type B mounting. To remove distributor, disconnect primary leads and manual advance rod. Remove distributor head with cables intact. Then loosen mounting stud clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 500 miles. Put a small bit of vaseline on the face of the breaker cam and a drop of light engine oil on the breaker arm pivots every 1000 miles. Put a few drops of light engine oil in the wick oiler under the rotor every 2000 miles.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 1835009, and follow complete directions in Equipment Section. Contacts can be synchronized after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position ($\frac{3}{4}$ inch on flywheel past top dead center). If the second set of contacts do not open at this point, loosen the two lock screws and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 10 degrees or $\frac{3}{4}$ inch on the flywheel past top dead center with the manual spark control fully retarded. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark control and continue to turn engine over until the flywheel mark '1&8' is 10 degrees or $\frac{3}{4}$ inch past the indicator on the flywheel housing when the ignition mark 'Time' will be directly opposite the indicator. Then loosen advance arm clamp screw and rotate distributor until the set of contacts mounted on the fixed base plate begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor contact (connected to center terminal in head) is connected to the spark plug in cylinder No. 1. Connect spark plugs as shown on diagram.



KISSEL

MODEL 8-126 (1930)

DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

Firing Order:—The firing order is 1-6-2-5-8-3-7-4. No 1 cylinder nearest the radiator.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 Long. Gaps are .030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{1}{8}$ inches. Stem diameter, $11/32$ inch. Stem length, $5\frac{1}{2}$ inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, $11/32$ inch. Inlet valves open at top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, $1\frac{1}{2}$ inches. Stem diameter, $11/32$ inch. Stem length, $5\frac{1}{2}$ inches. Tappet clearance, .008 inch (hot). Spring pressure, 85 pounds. Valve lift, $11/32$ inch. Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Model 720-Q. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 150 R.P.M. drawing 175 amperes at 4.5 volts. Starter switch is Model 406-A. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
Free	6000	5.0	65
15 lb. ft.	Lock	3.15	570

Mounting:—Starter is mounted with a SAE No. 1 flange mounting at the right of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and remove flange mounting studs. Then pull starter forward and out.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter oilers every month or each 1000 miles.

GENERATOR:—Model 941-W. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165 degrees

F. cutting the resistance across the thermostat contacts in series and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is base mounted at right of engine and is driven by an extension of the water pump shaft. To remove generator, disconnect lead and drive coupling and take out base mounting bolts. Then lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay contacts close at approximately 575 R.P.M. of the armature when the voltage of the generator reaches 6.75-7 volts. The charging current at closing of contacts must not exceed 3 amperes. Discharge current at opening of contacts is 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .012-.017 inch with contacts closed.

LIGHTING:—Clum Switch Model 10677. Lighting switch is mounted at base of the steering column on the frame. Dimming is by resistance. Headlights are 6-8 volt, 32 cp. S.C. Mazda 1133. Side, tail, stop and backing lights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash and corner lights are 6-8 volt, 6 cp. D.C. Mazda 82. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—Fuses are mounted on the dash. They are 10 ampere capacity.

LA SALLE

SERIES 340. SERIAL NUMBERS 600,001 UP
 PRODUCTION STARTED AUGUST 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Exide, Type 3-LXV-15-2G, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 137 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model 530-B. Coil is mounted on the radiator brace rods directly over the distributor. Ignition current is 2.5 amperes with engine running and 2 amperes with engine stopped.

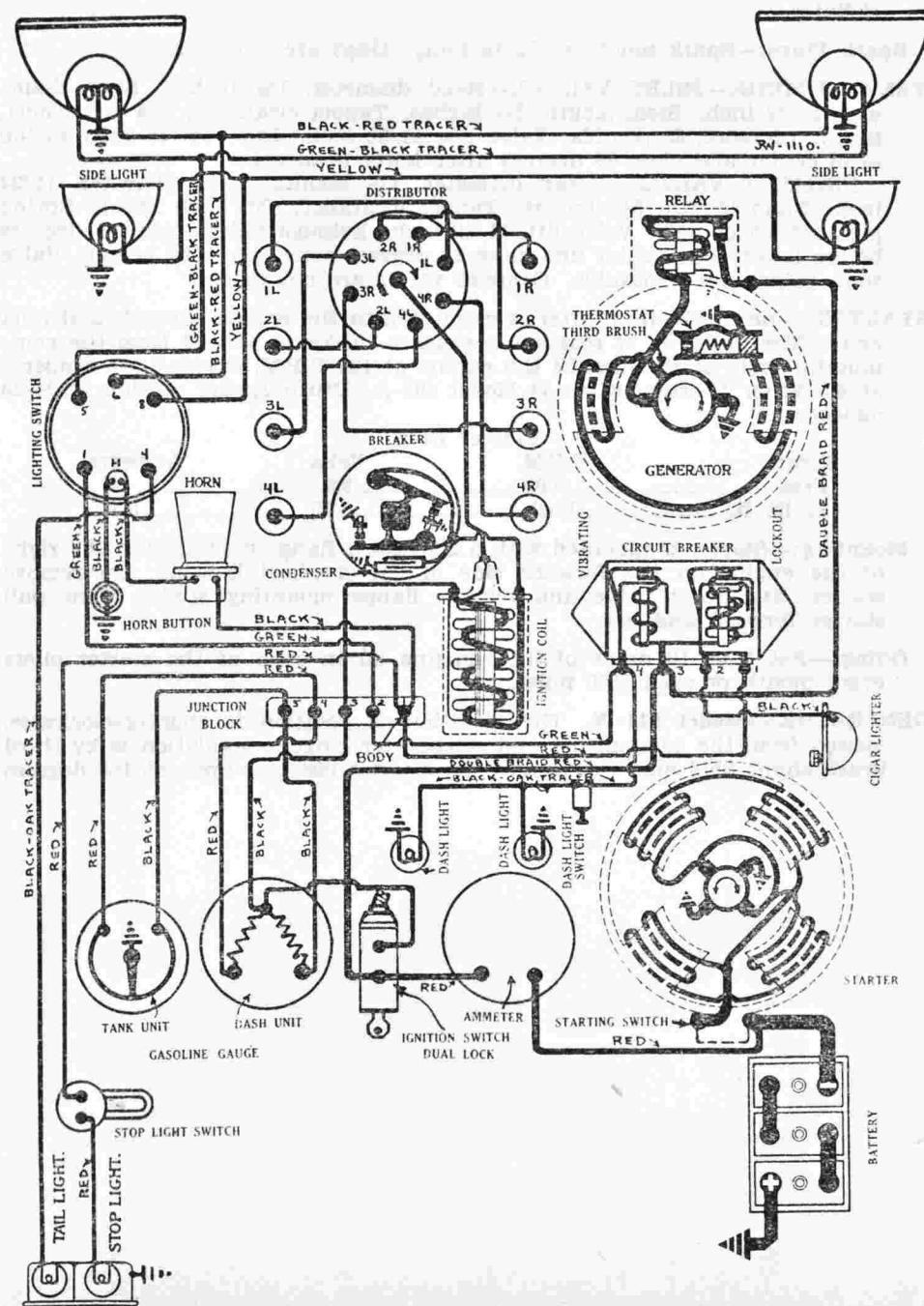
Distributor Models 4050, 4056, 4055. Breaker contacts separate .018-.022 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Tighten the lock nut. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 40 degrees (engine). Automatic advance begins at 1000 R.P.M. (engine). Maximum automatic advance is 30 degrees reached at 3800 R.P.M. Breaker has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for correct performance. See Timing. Ignition switch is Delco-Remy Dual Lock Model 426-L, 426-M or 426-P.

Mounting:—Distributor is mounted at the front of the engine between the cylinder blocks. To remove distributor, disconnect primary lead and spark control rod and remove distributor head with cables intact. Then take out two hold-down screws and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor housing every 1000 miles of operation. At the same time put a drop of oil on the breaker arm pivot pins and in the hole drilled in the top of the breaker cam which oils the path of the breaker arm rubbing blocks on the face of the cam.

Timing:—**Synchronization of Contacts.** The interval between the opening of the two sets of contacts must be exactly 45 degrees (distributor). This can be set by using special Delco-Remy Tool, Part No. 822572, and following directions on Distributors in Equipment section. The breakers may be synchronized without use of the tool after the distributor has been timed to the engine by cranking the engine over 90 degrees from the firing position of piston No. 1 when the flywheel mark 'IG/A-2-6' will be opposite the indicator. If the second set of contacts does not open at this point, the lock screws on the breaker arm mounting plate should be loosened and the eccentric adjusting screw turned until the contacts begin to open. Then tighten the lock screws and check the contact gap.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $2\frac{1}{2}$ inches (on the flywheel) before top dead center with the spark control lever in the fully advanced position. With piston No. 1 in firing position the flywheel mark 'IG/A-1-5' will be opposite the indicator on the flywheel case. This mark is $2\frac{1}{2}$ inches before the top dead center position of the piston. To set timing, crank engine over until piston No. 1 reaches firing position. Fully advance spark control lever. Then loosen taper screw in center of breaker cam and rotate cam until the set of contacts mounted on the stationary breaker plate begin to open. Tighten the screw and check to see that segment directly opposite rotor is connected to the spark plug in cylinder No. 1. The second set of contacts open exactly 45 degrees after this point.



LA SALLE

SERIES 340. SERIAL NUMBERS 600,001 UP
 PRODUCTION STARTED AUGUST 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

Firing Order:—The firing order is IL-4R-4L-2L-3R-3L-2R-1R. Cylinder banks are right and left as viewed from the driver's seat. No. 1 cylinder is nearest the radiator.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-10. Gaps are .025-.028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.785-1.791 inch. Stem diameter, $\frac{3}{8}$ inch. Stem length, $6\frac{1}{8}$ inches. Valve lift, $23/64$ inch. Spring pressure, 79 pounds compressed to $2\frac{1}{2}$ inches (valve closed). Tappet clearance, .004 inch (cold). Inlet valves open 11 degrees before top dead center and close 59 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1.696-1.702 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, $6\frac{7}{64}$ inches. Valve lift, $23/64$ inch. Spring pressure, 79 pounds compressed to $2\frac{1}{2}$ inches (valve closed). Tappet clearance, .006 inch (cold). Exhaust valves open 48 degrees before lower dead center and close 8 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model 728-D.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch and an overrunning clutch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	2500.....	5.....	70.....
28 ".....	Lock.....	3.....	600.....

Mounting:—Starter is mounted at right of engine on rear of flywheel case. To remove starter, disconnect cable and starting pedal linkage and take out three flange mounting cap screws. Then pull starter to rear to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—**Model 927-D.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at approximately 165°F. cutting the resistance in series with the field and reducing the output 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the end plate. Then shift the third brush mounting plate by hand. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. The maximum standard charging rate is 10-12 amperes (hot) at 7.3-7.7 volts reached at 1600 R.P.M. or 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
18-20.....	8.2-8.6.....	1450.....	10-12.....	7.3-7.7.....	1600.....

Brush spring tension is 16-20 ounces. Generator field current is 1.8-2.3 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take out lower flange mounting cap screw and remove nuts on upper flange mounting bolts. Then pull generator to rear to disengage coupling and lift from place.

Drive Chain Adjustment:—To adjust generator and water pump drive chain, loosen two pivot screws and nuts on flange mounting. Then force water pump away from engine until chain is tight. Then back off approximately $\frac{1}{8}$ inch and tighten mounting screws and nuts.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 500 miles of operation.

RELAY:—**Model 266-N.** Relay is mounted on the generator. Relay closes at 420 R.P.M. or 8-10 miles per hour when the generator voltage reaches 7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.021 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—**Switch Model 486-H.** Lighting switch is mounted at lower end of the steering column. Double filament headlights using the second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights or parking lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome and corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—**Model 5759.** This device consists of a vibrating and lockout circuit breaker mounted on the dash. The vibrating unit protects the lighting circuits. It starts to operate when the current reaches 25-30 amperes and continues limiting the current to 5-15 amperes. The lockout circuit breaker protects the horn, stop light, inspection light, cigar lighter and body light circuits. It begins to operate when the current reaches 25-30 amperes and continues limiting the current to less than 1 ampere. Contact gap is .012-.030 inch. Air gap between armature and coil core is .015-.025 inch. Plunger spring tension is 5 ounces.

NOTE:—Distributor Model 4050 as used on first 2893 cars has the condenser mounted inside the distributor case. After Engine Unit No. 6-2893 condenser is mounted outside the distributor case. Distributor Model 4055 is used after Serial No. 5170.

MARMON
ROOSEVELT MODEL (1930)
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—National, Type H3-15X, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted on left frame member under the driver's seat.

IGNITION:—Coil Model 528-T. The ignition switch is incorporated in the base of the coil. Coil is mounted on the back of the instrument board with the switch extending through to the face of the instrument panel. Ignition current is 2 amperes at 6 volts with engine running and 3 amperes at 6 volts with engine stopped.

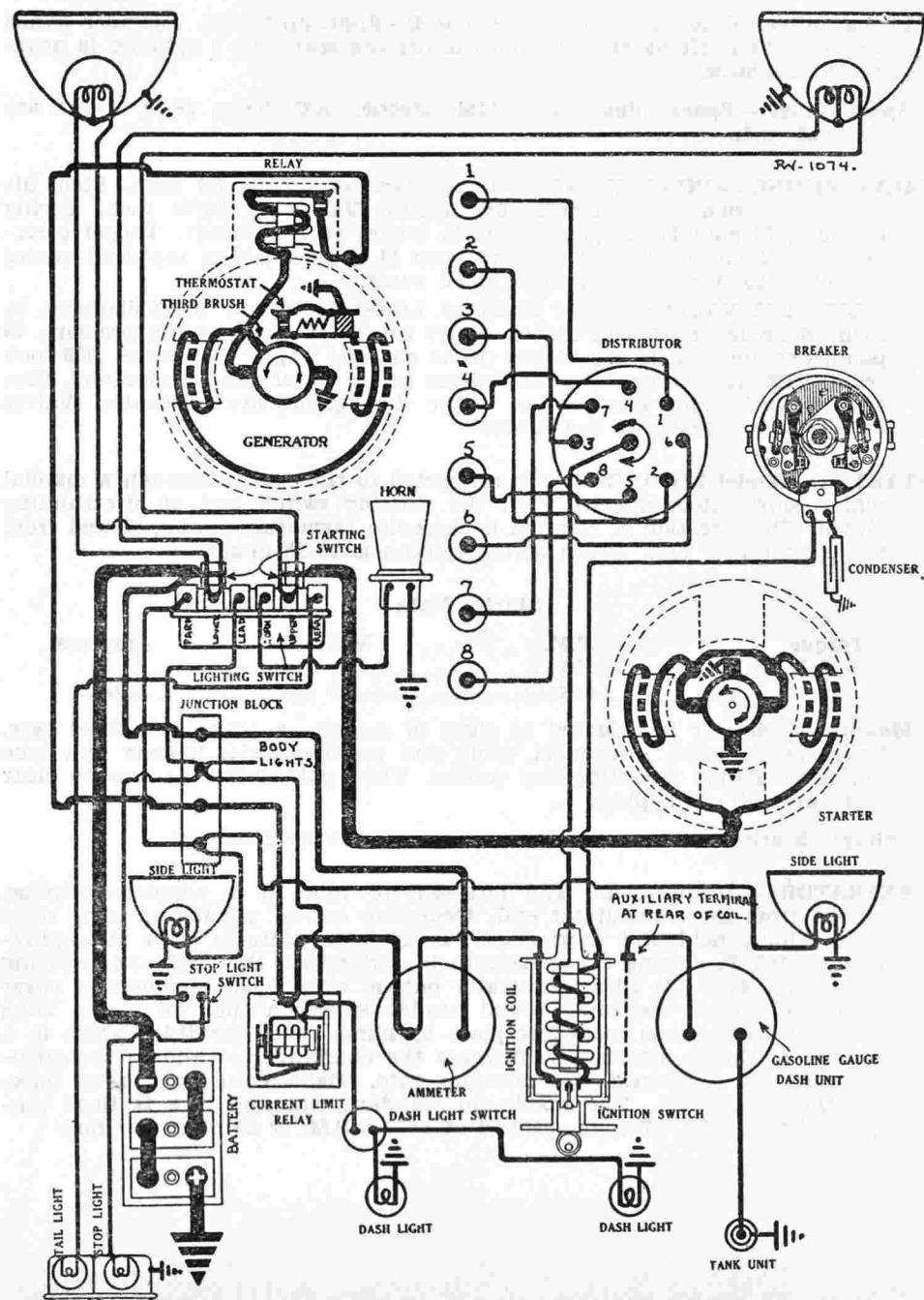
Distributor Model 658-C. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. (engine). Maximum automatic advance is 25 degrees reached at 2600 R.P.M. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval and contacts must be synchronized for proper performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual spark control wire and remove distributor head with cables intact. Then remove manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every 750 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contact on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions given in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position ($7\frac{1}{2}$ degrees or two teeth on the flywheel before top dead center with the spark control fully advanced). If the second set of contacts do not separate at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the breaker gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $7\frac{1}{2}$ degrees or two teeth on the flywheel before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and continue to crank engine until piston reaches firing position when flywheel mark 'IGN' will be opposite the indicator in the inspection hole in the upper flywheel housing. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor



MARMON

ROOSEVELT MODEL (1930)
 PRODUCTION STARTED JANUARY 1, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{15}{32}$ inches. Stem diameter, .3095 inch. Stem length, 4 $\frac{61}{64}$ inches. Valve lift, $\frac{21}{64}$ inch. Spring pressure, 43 pounds valve closed, and 80 pounds valve open. Tappet clearance, .006-.008 inch (hot). Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{11}{32}$ inches. Stem diameter, .3085 inch. Stem length, 4 $\frac{61}{64}$ inches. Valve lift, $\frac{21}{64}$ inch. Spring pressure, 43 pounds valve closed, and 80 pounds valve open. Tappet clearance, .006-.008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center.

STARTER:—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter switch is combined with the lighting switch at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-X. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and remove the commutator cover band. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after mak-

ing the adjustment. With standard car setting the maximum charging rate is 9-12 amperes (hot) reached at 2000 R.P.M. or 25 M.P.H.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
21	8.5	1450	12	7.5	2000

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp bolt. Then remove two bolts in bracket and lift generator from place.

Belt Adjustment:—Loosen clamp bolt and swing generator away from engine until proper belt tension is secured. Tighten clamp bolt. Be careful not to get too much tension on the belt or it will crowd the generator bearings.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 750 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open at 8 M.P.H. with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—‘Aid’ Switch Lighting switch is mounted at lower end of steering column. It is of the ‘Finger Tip’ control type and incorporates the starting switch and horn button with the lighting switch. Headlights are ‘Twolite’ double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to operate when the current reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contacts separate .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

NOTE:—The lighting switch is of Aid Manufacturing Company design and is their Model No. 312.

MARMON

MODEL 8-69 (1930) SERIAL NUMBERS Q-130-1 UP
 PRODUCTION STARTED JANUARY 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—National, Type H3-15X, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 120 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted on the left frame member under the driver's seat.

IGNITION:—Coil Model 526-P. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 2.5 amperes at 6 volts with engine running and 4.7 amperes at 6 volts with engine stopped.

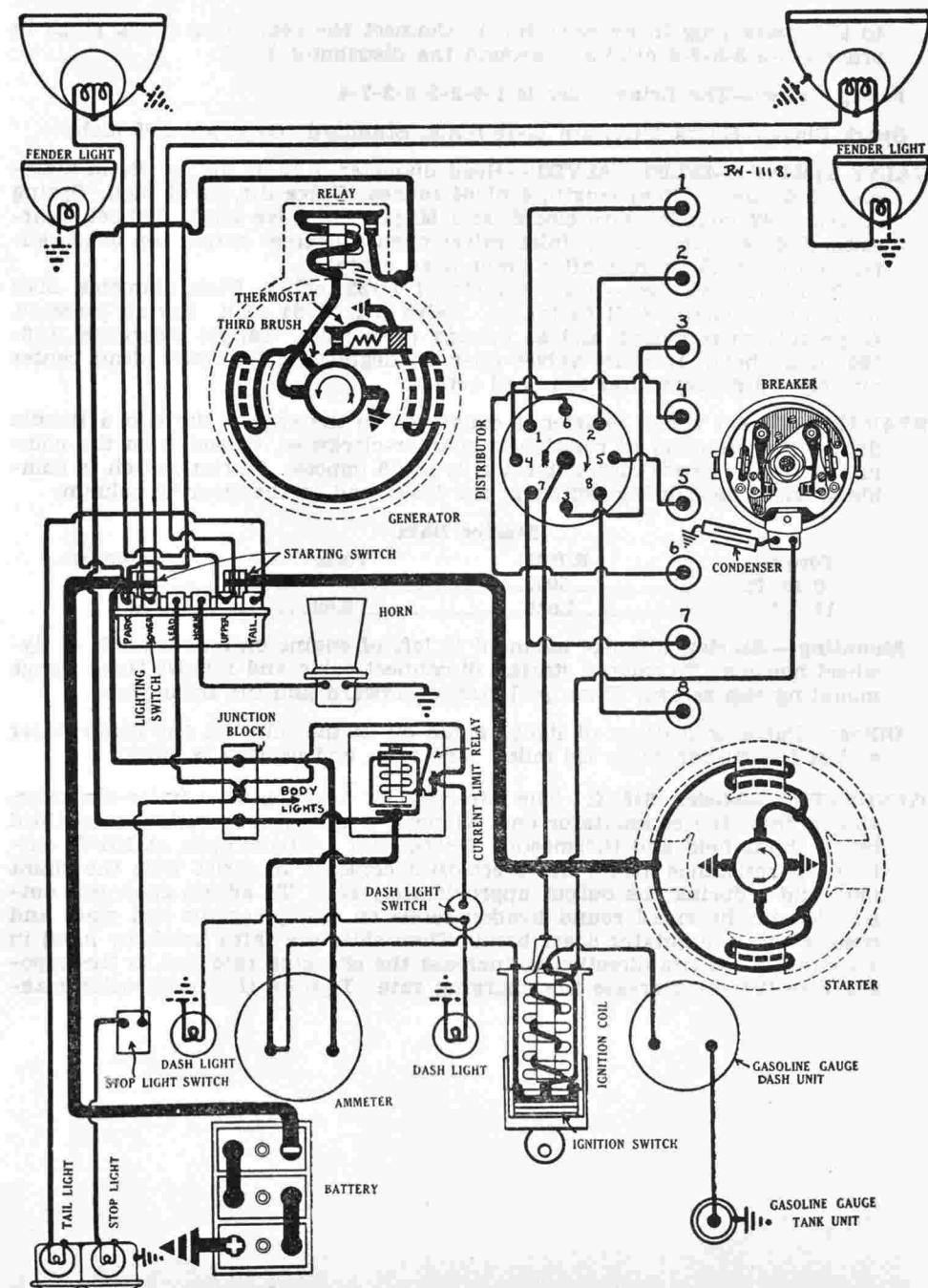
Distributor Model 658-C. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 20 degrees. Distributor is semi-automatic. Maximum manual advance is 20 degrees. Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2600 R.P.M. of engine. Manual advance is controlled by a button on the dash and distributor is designed to operate with the spark control button in the fully advanced position. Pulling out the button provides an auxiliary retard for starting. Breaker has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized to secure this firing interval for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and can be removed from the right side. To remove distributor, disconnect primary lead and spark control wire and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one full turn every month or each 750 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Timing Distributor to Engine.** Breaker contacts begin to open when the piston entering power stroke reaches a position $7^{\circ}30'$ or two teeth (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Place spark control button in the fully advanced position (pushed all the way in toward the dash) and see that distributor is turned counter-clockwise to the full limit of the advance arm slot. Continue to crank engine over until the top dead center mark 'DC.1&8' is two teeth before the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until the first set of contacts mounted on the base plate begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Synchronization of Contacts. Full directions for synchronization of contacts and use of the special Delco-Remy tool, Part No. 820738, are given in the Equipment Section. Contacts can be synchronized without special equip-



MARMON

MODEL 8-69 (1930) SERIAL NUMBERS Q-130-1 UP
 PRODUCTION STARTED JANUARY 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

ment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (two teeth on the flywheel before top dead center). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until contacts open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES: Head diameter, 1 $15/32$ inches. Stem diameter, .3095 inch. Stem length, 4 $61/64$ inches. Valve lift, 21/64 inch. Spring pressure, 43 pounds (valve closed) and 80 pounds (valve open). Tappet clearance, .007 inch (hot). Inlet valves open 6 degrees before top dead center and close 40 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $11/32$ inches. Stem diameter, .3085 inch. Stem length, 4 $61/64$ inches. Valve lift, 21/64 inch. Spring pressure, 43 pounds (valve closed) and 80 pounds (valve open). Tappet clearance, .007 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 6 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 714-C. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter switch is combined with the lighting switch at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	.5.....	65.....
12 "	Lock.....	3.63.....	475.....

Mounting:—Starter is flange mounted at the left of the engine on the forward side of the flywheel housing. To remove starter, disconnect cable and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-X. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 162°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small

round headed screw on the outside of the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting maximum charging rate is 9-12 amperes (hot) reached at 2000 R.P.M. or 25 miles per hour.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
21.....	8.5.....	1450.....	12.....	7.5.....	2000.....

Brush spring tension is 14-18 ounces. Shunt field current is 4-6.1 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is mounted by special swinging bracket at left of engine and is driven by the fan belt. To remove generator, disconnect lead and loosen mounting clamp bolt. Swing generator toward engine and slip off drive belt. Then take out two bolts mounting generator on bracket and lift generator from place.

Fan Belt Adjustment. The fan belt is adjusted by shifting the generator. To adjust belt tension, loosen the adjustment clamp bolt and swing generator out from engine until correct belt tension is secured. Tighten the clamp bolt. The belt should have sufficient tension to drive generator and fan without slipping. Any excessive tension will cause wear in the generator bearings.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every month or each 750 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. or 10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Aid 'Finger Tip Control' Switch Model 312. Lighting switch is mounted at lower end of steering column. It incorporates the lighting switch, horn button and starting switch in a single unit controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash. It is connected in the lighting circuits to protect them from overload and short-circuits. The circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 2-15 amperes. Contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

MARMON

MODEL 8-79 (1930) SERIAL NUMBERS W-100-1 UP
 PRODUCTION STARTED NOVEMBER, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—National, Type B3-17X, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 140 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28 hours. Battery is mounted on left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 526-P. The ignition switch is built in the base of the coil. Ignition coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 2.5 amperes at 6 volts with engine running and 4.7 amperes at 6 volts with engine stopped.

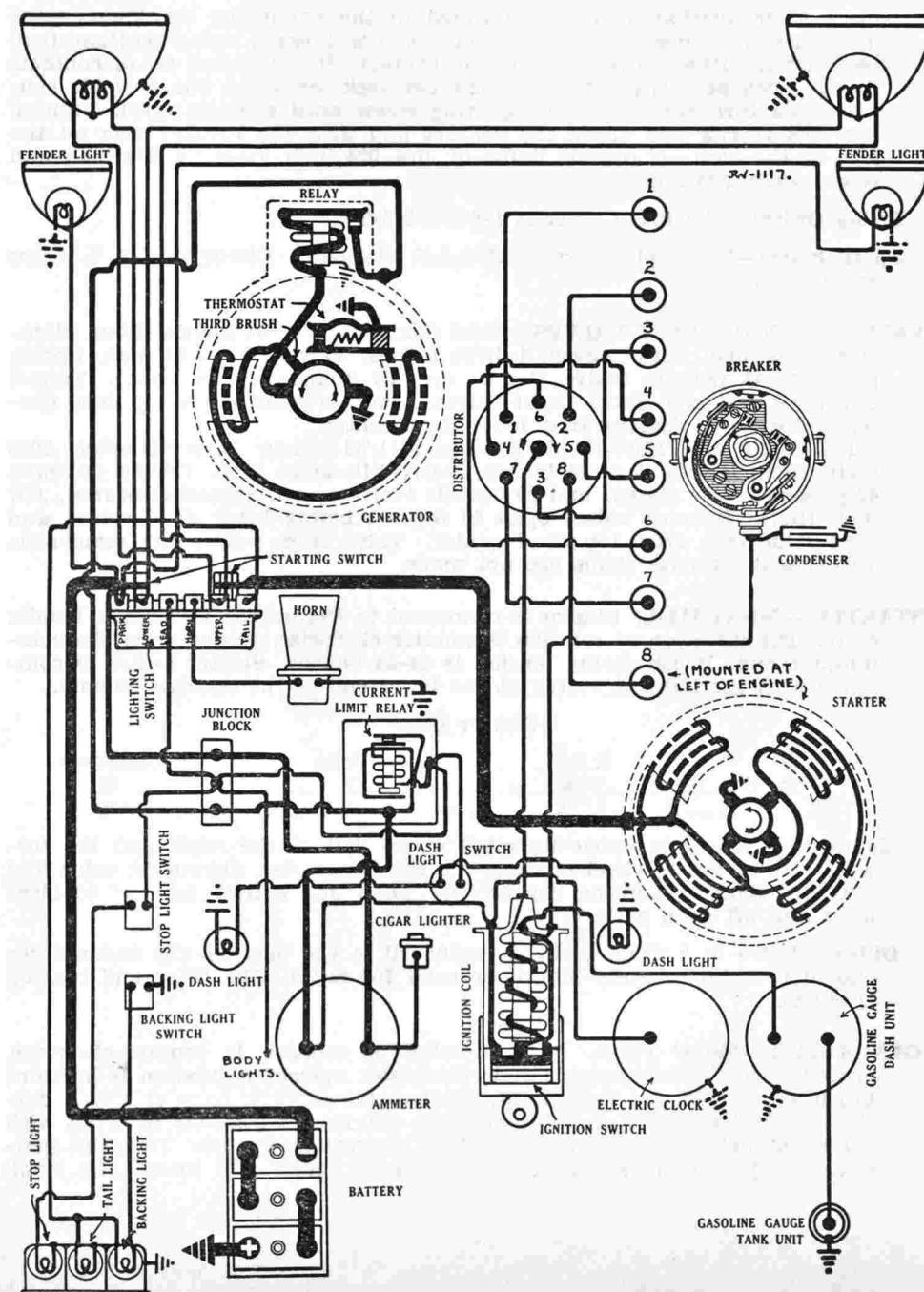
Distributor Model 652-D. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2600 R.P.M. of engine. The manual advance is controlled by a button on the dash. The fully advanced position is with the button pushed all the way in toward the dash. The breaker has two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized to secure this exact firing interval for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and spark control wire and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every month or each 750 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Full directions for synchronization of contacts and the use of the special Delco-Remy tool, Part No. 820738, are given in the Equipment Section. Contacts can be synchronized without special equipment after the distributor has been timed to the engine by cranking the engine over exactly 90 degrees when piston No. 6 will reach firing position (piston on compression stroke 2 flywheel teeth before top dead center). If the second set of contacts does not open at this instant, loosen two lock screws on movable sub-plate and turn eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position $5^{\circ}40'$ or two teeth on the flywheel before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Advance spark control button and see that distributor is rotated counter-clockwise to the full extent of the advance arm slot. Continue to crank



MARMON

MODEL 8-79 (1930) SERIAL NUMBERS W-100-1 UP
 PRODUCTION STARTED NOVEMBER, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

engine over until a point on the flywheel two teeth before the top dead center mark 'DC.1&8' is directly opposite the indicator on the crankcase. Then loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted on the stationary base plate) begin to open. Tighten the clamp screw and see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion Type 8-S. Gaps are .028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.684 inches. Stem diameter, .3417 inch. Stem length, 5 $\frac{1}{8}$ inches. Valve lift, 11/32 inch. Spring pressure, 55 pounds (valve closed) and 100 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open at top dead center and close 50 degrees after lower dead center. The flywheel is marked 'DC.1&8' at the point of inlet opening for cylinders Nos. 1 and 8.

EXHAUST VALVES:—Head diameter, 1.562 inches. Stem diameter, .3407 inch. Stem length, 5 59/64 inches. Valve lift, 11/32 inch. Spring pressure, 55 pounds (valve closed) and 100 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 718-M. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 125 R.P.M. Starter switch is combined with the lighting switch at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	1227.....	5.5.....	65.....
16 ".....	Lock.....	3.15.....	.570.....

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-F. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 162°F. cutting the

resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.5 volts reached at 1600 R.P.M. or 30 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
21.....	8.4.....	1600.....	12.....

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 6 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is cradle mounted at the left of the engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump coupling and remove clamp band stud nut. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every month or each 750 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.5-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Aid 'Finger Tip Control' Switch Model 312. Lighting switch is mounted at lower end of steering column. The lighting switch, starting switch and horn button are incorporated in a single unit controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash. It is connected in the lighting circuits and is designed to protect them against excessive load and short-circuits. The circuit breaker begins to operate when the current reaches 25-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

MARMON

BIG EIGHT MODEL (1930) SERIAL NUMBERS H-110-1 UP
 PRODUCTION STARTED NOVEMBER, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—National, Type B3-17X, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 140 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28 hours. Battery is mounted on left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 526-P. The ignition switch is built in the base of the coil. Ignition coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 2.5 amperes at 6 volts with engine running and 4.7 amperes at 6 volts with engine stopped.

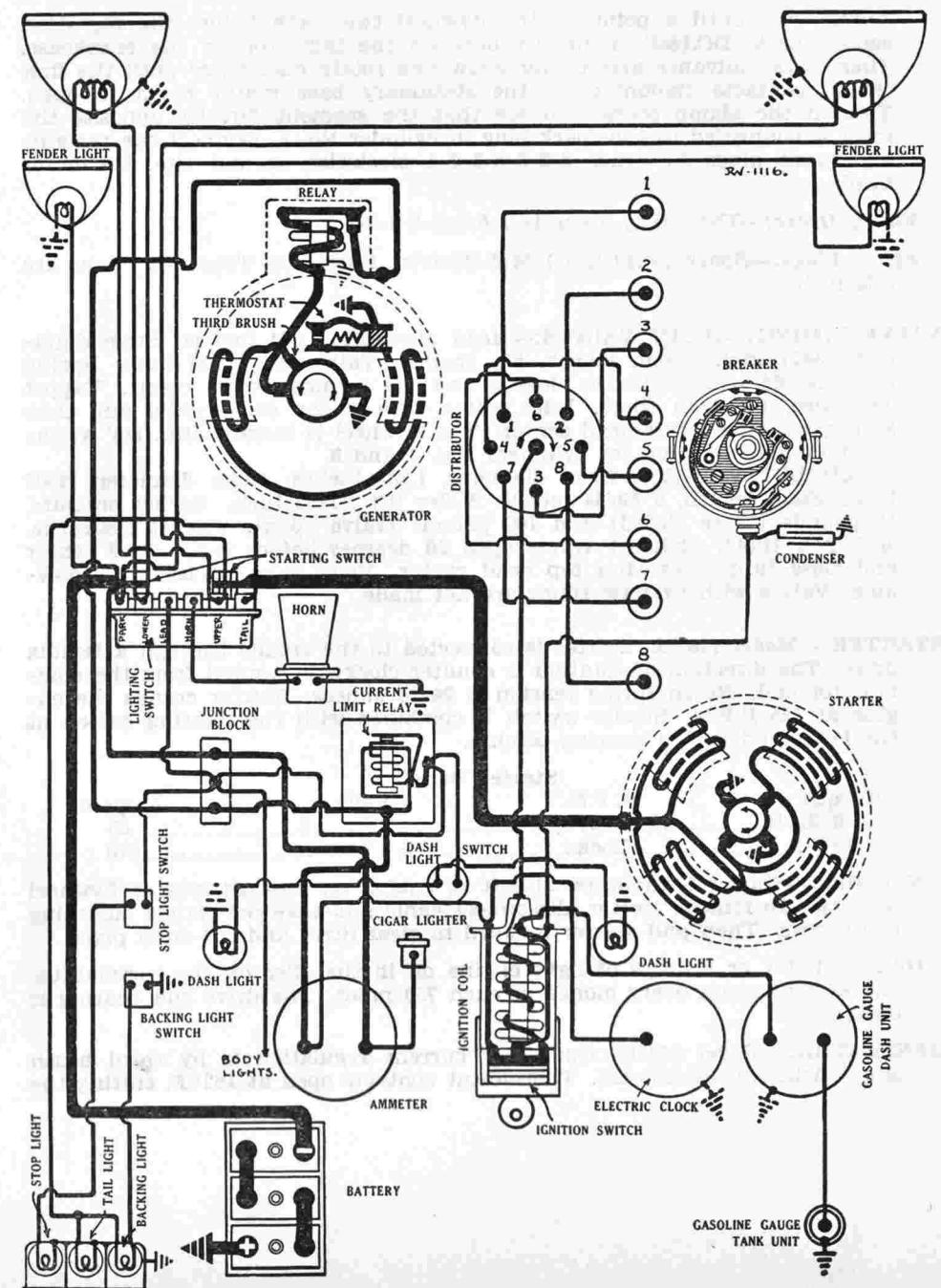
Distributor Model 652-D. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2600 R.P.M. of engine. The manual advance is controlled by a button on the dash. The fully advanced position is with the button pushed all the way in toward the dash. The breaker has two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized to secure this exact firing interval for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and spark control wire and remove distributor head with cables intact. Then take out stop screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one full turn every month or each 750 miles. Every 1000 miles remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Full directions for synchronization of contacts and the use of the special Delco-Remy tool, Part No. 820738, are given in the Equipment Section. Contacts can be synchronized without special equipment after the distributor has been timed to the engine by cranking the engine over exactly 90 degrees when piston No. 6 will reach firing position (piston on compression stroke 2 flywheel teeth before top dead center). If the second set of contacts does not open at this instant, loosen two lock screws on movable sub-plate and turn eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position $5^{\circ}40'$ or two teeth on the flywheel before top dead center with the spark control button in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Advance spark control button and see that distributor is rotated counter-clockwise to the full extent of the advance arm slot. Continue to crank engine over until a point on the flywheel two teeth before the top dead



MARMON

BIG EIGHT MODEL (1930) SERIAL NUMBERS H-110-1 UP
 PRODUCTION STARTED NOVEMBER, 1929
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

center mark 'DC.1&8' is directly opposite the indicator on the crankcase. Then loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted on the stationary base plate) begin to open. Tighten the clamp screw and see that the segment directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion Type 8-S. Gaps are .028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1.684 inches. Stem diameter, .3417 inch. Stem length, 5 $\frac{1}{2}$ inches. Valve lift, 11/32 inch. Spring pressure, 55 pounds (valve closed) and 100 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open at top dead center and close 50 degrees after lower dead center. The flywheel is marked 'DC.1&8' at the point of inlet opening for cylinders Nos. 1 and 8.

EXHAUST VALVES:—Head diameter, 1.562 inches. Stem diameter, .3407 inch. Stem length, 5 59/64 inches. Valve lift, 11/32 inch. Spring pressure, 55 pounds (valve closed) and 100 pounds (valve open). Tappet clearance, .008 inch (hot). Exhaust valves open 50 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 718-M. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 125 R.P.M. Starter switch is combined with the lighting switch at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	1227	5.5	65
16 "	Lock	3.15	570

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every month or each 750 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-F. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 162°F. cutting the

resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 12 amperes (hot) at 7.5 volts reached at 1600 R.P.M. or 30 miles per hour.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
21	8.4	1600	12

Shunt field current is 5 amperes at 6 volts. Generator motoring draws 6 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is cradle mounted at the left of the engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect lead and water pump coupling and remove clamp band stud nut. Then lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every month or each 750 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. when the generator voltage reaches 6.5-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Aid 'Finger Tip Control' Switch Model 312. Lighting switch is mounted at lower end of steering column. The lighting switch, starting switch and horn button are incorporated in a single unit controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights (for parking) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash. It is connected in the lighting circuits and is designed to protect them against excessive load and short-circuits. The circuit breaker begins to operate when the current reaches 25-30 amperes and continues limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

NASH

SINGLE SIX MODEL 450 (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-5X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4065-A. Coil is mounted on the top of the engine. Ignition current is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. There is a resistance coil in series with the primary.

Distributor Model IGB-4015. Breaker contacts separate .020-.024 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is of the full automatic advance type. Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 30 degrees (engine) reached at 3380 R.P.M. of engine.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then remove set screw and lock nut on side of distributor shaft housing and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor with light engine oil every 500 miles. Put one drop of oil on the breaker arm pivot pin and a small bit of vaseline on the face of the breaker cam every 1000 miles.

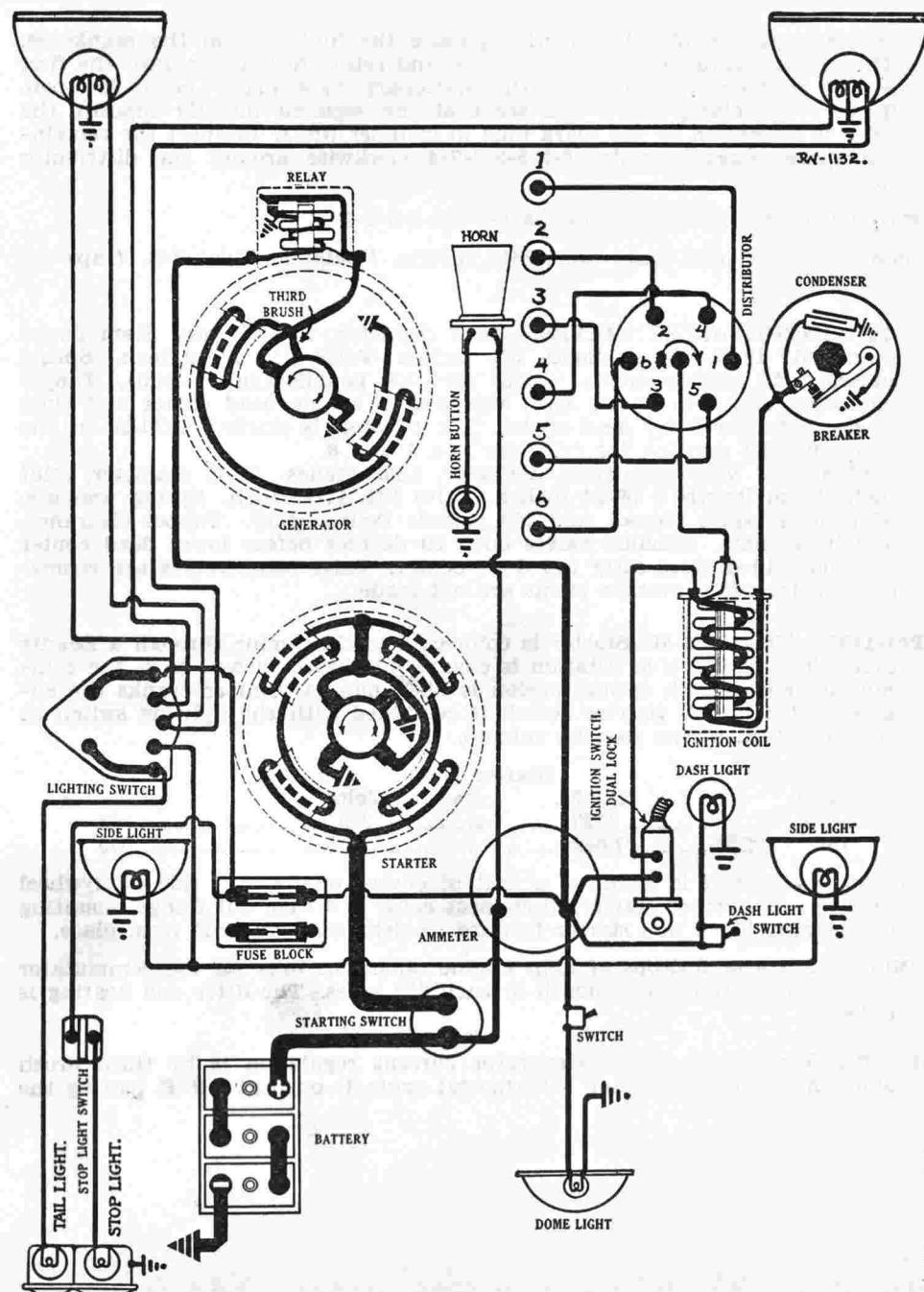
Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position $\frac{1}{2}$ inch (on the flywheel) before top dead center. To check timing, crank engine over until piston No. 1 is coming up on compression stroke (both valves will be closed). Continue to crank engine over until piston reaches a position one half inch before top dead center when the notch which indicates the top dead center position for cylinders 1 and 6 will be one half inch before the indicator in the flywheel housing at the right of the engine. Then loosen the clamp screw and rotate the distributor until the contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Aircraft Metric. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{17}{32}$ inches. Stem diameter, .3095 inch. Stem length, 5 $\frac{7}{32}$ inches. Valve lift, 5/16 inch. Spring pressure, 45 pounds (valve closed) and 76 pounds (valve open). Tappet clearance, .008 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{13}{32}$ inches. Stem diameter, .3095 inch. Stem length, 5 $\frac{7}{32}$ inches. Valve lift, 5/16 inch. Spring pressure, 45 pounds (valve closed) and 76 pounds (valve open). Tappet clearance, .008 inch. Exhaust valves open 45 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.



NASH

SINGLE SIX MODEL 450 (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

STARTER:—Model MAB-4026. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter switch is Model SW-3080. Switch is mounted on the starter and is operated through a flexible control from a button on the dash. Brush spring tension is 18-36 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900	100	
3.5 "	1100	200	
6.6 "	700	300	
10.2 "	410	400	
24 "	Lock	725	

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect starting cable and switch control and take out flange mounting screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of engine oil in the oiler at each end of the starter every month or each 1000 miles of operation.

GENERATOR:—Model GAL-4129. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 24 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine on rear face of front engine cross member. Generator is belt driven from the crankshaft. To remove generator, disconnect lead and take off drive pulley and belt. Then take out flange mounting bolts and lift generator from place.

Oiling:—Put 4 or 5 drops of engine oil in each of the generator bearings oilers every two weeks or each 500 miles of operation.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 9-9.5 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-C. Lighting switch is mounted at the base of the steering column. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side, dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuse mounted on fuse block on the dash is 20 ampere capacity.

NASH
TWIN IGNITION SIX MODEL 480 (1930)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-5X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18.4 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model IG-4065 (2 used). Coils are mounted at right of engine. Ignition current of each coil is 1-3 amperes at 6 volts with engine running and 3-4.5 amperes at 6 volts with engine stopped. The ammeter will indicate the current drawn by both coils and should register an 8-10 ampere discharge with ignition turned on and engine stopped whenever the breaker contacts are closed. The ignition switch is a Delco-Remy Dual Lock.

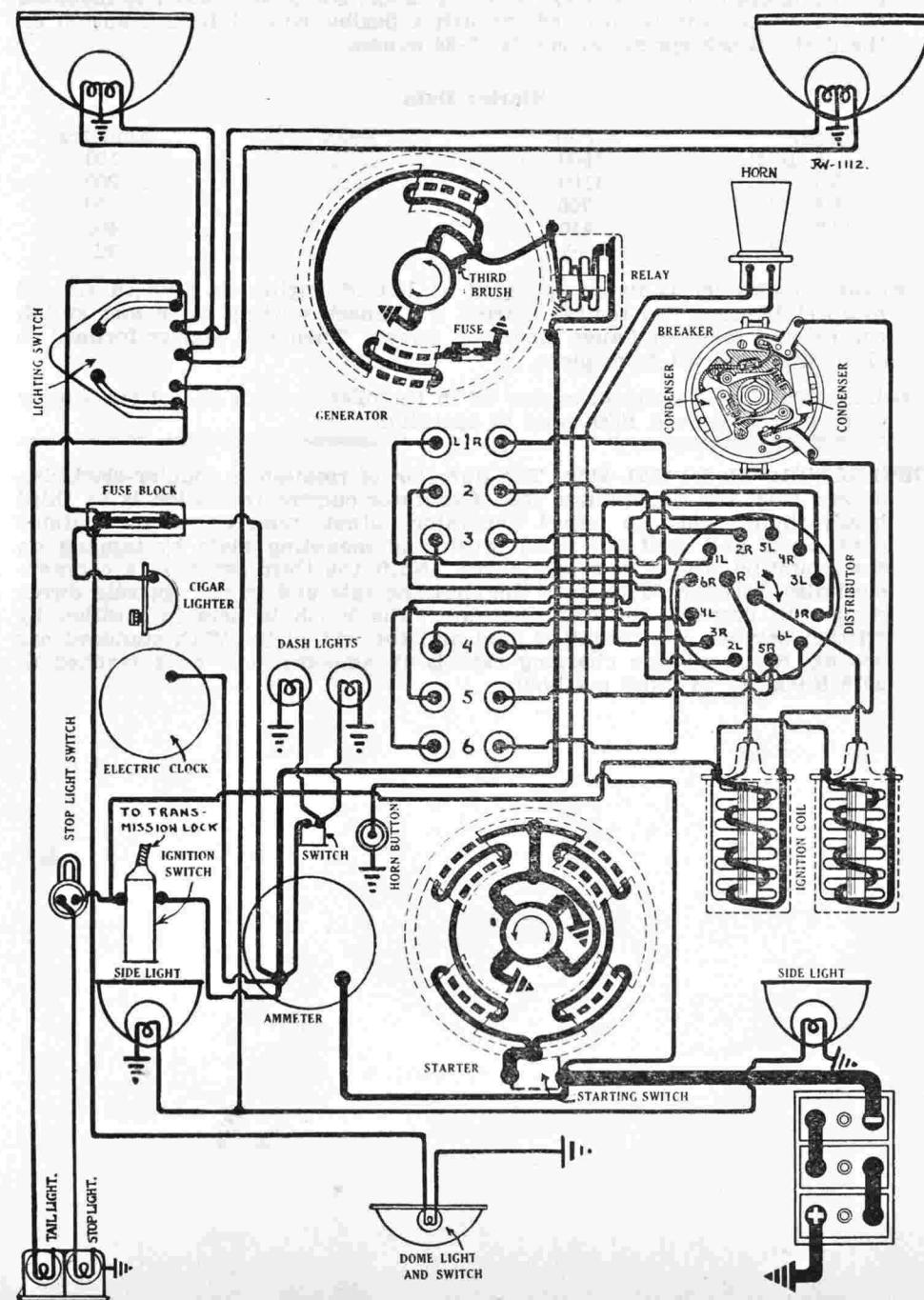
Distributor Model IGE-4005. Breaker contacts separate .020-.024 inch (new) or .018-.020 inch after 1000 miles. Set contact gap (first set mounted on distributor base plate) by loosening the two lock screws on the stationary contact mounting plate and turning the eccentric adjusting screw until the correct gap is secured with the breaker arm on the lobe of the cam. The second set of contacts (mounted on the movable sub-plate) are adjusted by loosening the lock nut on the stationary contact mounting stud and turning up the stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. The two sets of contacts operate on a single six sided cam. Each set controls one ignition coil and fires one set of spark plugs. Both sets of contacts should open at the same instant and contacts must be synchronized to secure this result. See Timing. Breaker arm spring tension is 20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 25 degrees reached at 2100 R.P.M. of engine.

Mounting:—Distributor is mounted at the right of the engine. To remove distributor, disconnect primary leads and manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every 500 miles. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** The contacts must be synchronized so as to open at the same instant. If this is not done and one set of contacts opens earlier than the other the full advantage of twin ignition will not be secured. Full directions for synchronizing contacts is given in the Equipment Section. Contacts can be synchronized as a part of the timing process (see next paragraph).

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 1.1 inches (on the front flywheel) before top dead center with the manual spark control in the fully advanced position and the distributor rotated counter-clockwise to the full limit of the advance arm slot. To set timing, crank engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Fully advance the spark control lever. Connect a six volt test lamp in series with each primary circuit to accurately determine when contacts open. Turn on ignition and continue to crank engine over until the mark 'IGN' on the front flywheel is directly opposite the pressed steel pointer on the crankcase. This mark is 1.1 inches before the top dead center position. The two lamps should go out at this point, indicating that the contacts have begun to open. If they do not, loosen the advance arm clamp bolt and



NASH

TWIN IGNITION SIX MODEL 480 (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

rotate the distributor until the set of contacts mounted on the stationary breaker plate open. Tighten the clamp bolt. Then loosen the three mounting lock screws on the sub-plate and shift the sub-plate until the second set of contacts begins to open. Tighten the lock screws. The distributor will then be correctly timed to the engine and the two sets of contacts will be correctly synchronized. Check to see that the rotor is directly opposite the segments connected to the spark plugs in cylinder No. 1 and connect the remaining spark plugs in accordance with the diagram.

The synchronization of the contacts can be checked very easily in service by turning on the ignition and noting the ammeter reading with both contacts closed. The ammeter should show a discharge of 8-10 amperes. Then crank engine over slowly and watch ammeter pointer. It should drop to '0' in one movement as the two sets of contacts open. If the pointer first drops to 4-5 amperes and then to '0' the contacts are not synchronized properly.

Firing Order:—The firing order is 1-5-3-6-2-4. Connect spark plugs as shown on the diagram.

Spark Plugs:—Spark plugs are 18MM. Metric. Aircraft Type. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 21/32 inches. Stem diameter, .3725-.3715 inch. Stem length, 4 7/16 inches. Spring pressure, 40 pounds (valve closed) and 95 pounds (valve open). Valve lift, .353 inch. Tappet clearance, .012 inch (hot). Inlet valves open 15 degrees after top dead center and close 38 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 21/32 inches. Stem diameter, .3725-.3715 inch. Stem length, 4 7/16 inches. Valve lift, .353 inch. Spring pressure, 40 pounds (valve closed) and 95 pounds (valve open). Tappet clearance, .012 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model MAD-4107, 4109.** Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 28-36 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
.4 lb. ft.....	2500.....	5.5.....	100
2.7 ".....	1350.....	5.0.....	200
5.3 ".....	815.....	4.5.....	300
8.5 ".....	425.....	4.0.....	400
15.2 ".....	Lock.....	3.6.....	760

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out large pilot mounting screw in flywheel housing directly above starter sleeve. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the starter every month or each 1000 miles of operation.

GENERATOR:—**Model GAR-4109.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 1700 R.P.M. or 27 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2.....	6.4	750
6.....	6.9	885
10.....	7.3	1030
14.....	7.65.....	1230
17.....	8.0	1700
14.....	7.65.....	2200

Brush spring tension is 24-32 ounces. Generator motoring draws 3.5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the left of the engine and is belt driven. To remove generator, disconnect lead and slip off drive belt. Then loosen clamp band and slip generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—**Model CB-4014.** Relay is mounted on the generator. Relay contacts close at 750 R.P.M. or 8-9 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—**Delco-Remy Switch Model 486-C.** Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs and use a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side, dash, tail and tonneau lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

FUSES:—Lighting fuse mounted on the fuse block on the dash is 20 ampere capacity.

NASH
TWIN IGNITION EIGHT MODEL 490 (1930)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-HVX-7X-6A, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 148.5 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 28.4 hours. Battery is mounted under the right front seat.

IGNITION:—Coil Model CE-4011 (2 used). Coils are mounted at the right of the engine. Ignition current of each coil is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped. The ammeter will indicate the current drawn by both coils and should register 8-10 ampere discharge with ignition turned on and engine stopped whenever the breaker contacts are closed. The ignition switch is a Delco-Remy Dual Lock.

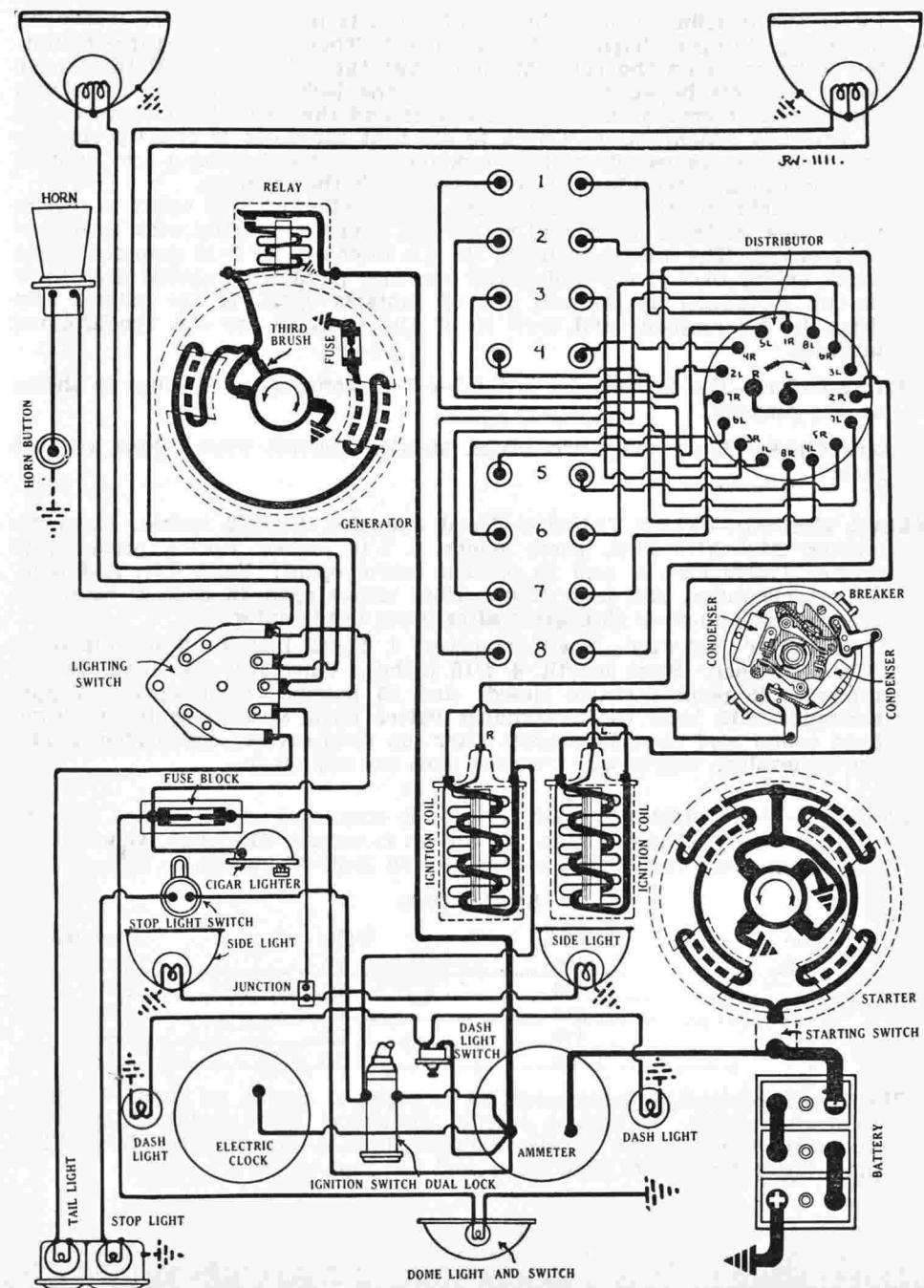
Distributor Model IGK-4002. Breaker contacts separate .020-.024 inch when new and .018-.020 inch after 1000 miles operation. Set contact gap (first set mounted on stationary breaker plate) by loosening the two lock screws on the stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. The second set of contacts (mounted on movable sub-plate) are adjusted by loosening the lock nut on the stationary contact mounting stud and turning up the stud. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 20 ounces. Each set of contacts controls one ignition coil and fires one set of spark plugs. The contacts should open at the same instant and must be synchronized to secure this result. See Timing. Distributor is semi-automatic. Maximum manual advance is 38 degrees (engine). Automatic advance begins at 450 R.P.M. of engine. Maximum automatic advance is 16 degrees reached at 2000 R.P.M. of engine.

Mounting:—Distributor is mounted at right of engine. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles. At the same time remove the distributor head and rotor and oil the wick oiler in the center of the shaft. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** The contacts must be synchronized so that they open at the same instant. If this is not done and one set of contacts opens earlier than the other the full advantage of twin ignition will not be secured. The procedure in synchronizing these contacts is identical with directions given in the Equipment Section on the Type IGE distributors. Contacts can be synchronized as part of the timing operation (see next paragraph).

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 1.1 inches on the front flywheel before top dead center with the manual spark control in the fully advanced position and the distributor rotated counter-clockwise to the full limit of the advance arm slot. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance the spark control lever. Connect a six volt test lamp in series with each primary circuit to accurately determine when the contacts open. Turn on ignition. Continue to crank engine over until the mark 'IGN' on the front flywheel is directly opposite the pressed steel pointer on the



NASH

TWIN IGNITION EIGHT MODEL 490 (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

crankcase. This mark is 1.1 inches before the top dead center position. The two lamps should go out at this point indicating that both sets of contacts have begun to open. If they do not, loosen the advance arm clamp bolt and rotate the distributor until the first set of contacts (mounted on the breaker plate) begin to open. Tighten the clamp bolt and loosen the three mounting lock screws on the movable sub-plate. Shift the sub-plate until the second set of contacts begin to open. Tighten the lock screws. The distributor will then be correctly timed to the engine and the two sets of contacts will be synchronized. Check to see that the rotor is directly opposite the segments connected to the spark plugs in cylinder No. 1. Connect the remaining spark plugs as indicated on the diagram.

The synchronization of the contacts can be checked readily by turning on the ignition and noting the ammeter reading with the contacts closed. This should be 8-10 amperes discharge. Then slowly turn the engine over and watch the ammeter. The pointer should drop to '0' in one movement as the contacts open. If the pointer first drops to 4-5 amperes and then to '0' as the engine is turned over the contacts are not synchronized properly.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4. Connect spark plugs as shown on the diagram.

Spark Plugs:—Spark plugs are 18MM. Metric. Aircraft Type. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, 1 23/32 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 5 9/16 inches. Valve lift, 11/32 inch. Spring pressure, 40 pounds (valve closed) and 95 pounds (valve open). Tappet clearance, .012 inch (hot). Inlet valves open 15 degrees after top dead center and close 38 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 17/32 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 5 9/16 inches. Valve lift, 11/32 inch. Spring pressure, 40 pounds (valve closed) and 95 pounds (valve open). Tappet clearance, .012 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model MAB-4024. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 28-36 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900.	..	100
3.5 "	1100.	..	200
6.6 "	700.	..	300
10.2 "	410.	..	400
24 "	Lock.	725	

Mounting:—Starter is sleeve mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out large

pilot mounting screw in flywheel case directly above starter sleeve. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the starter every month or each 1000 miles of operation.

GENERATOR:—Model GAR-4110. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17 amperes at 8 volts reached at 1700 R.P.M. or 35 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	750
6	6.9	885
10	7.3	1030
14	7.65	1230
17	8.0	1700
14	7.65	2200

Brush spring tension is 24-32 ounces. Generator motoring draws 3.5 amperes at 6 volts. Shunt field current is 2.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the left front of the engine and is driven by the fan belt. To remove generator, disconnect lead and loosen mounting clamp band. Slip off drive belt. Lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 750 R.P.M. or 7-8 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-C. Lighting switch is mounted at lower end of steering column. Headlights are equipped with double filament bulbs and use a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side, dash, tail and tonneau lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

FUSES:—Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

OAKLAND

EIGHT MODEL 0/8 (1930) SERIAL NUMBERS 273500-08 UP
 PRODUCTION STARTED JANUARY 4, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Delco, Type 15-A, or Willard, Type WSB-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 526-R. The ignition switch is built in the base of the coil. Coil is mounted on the rear of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

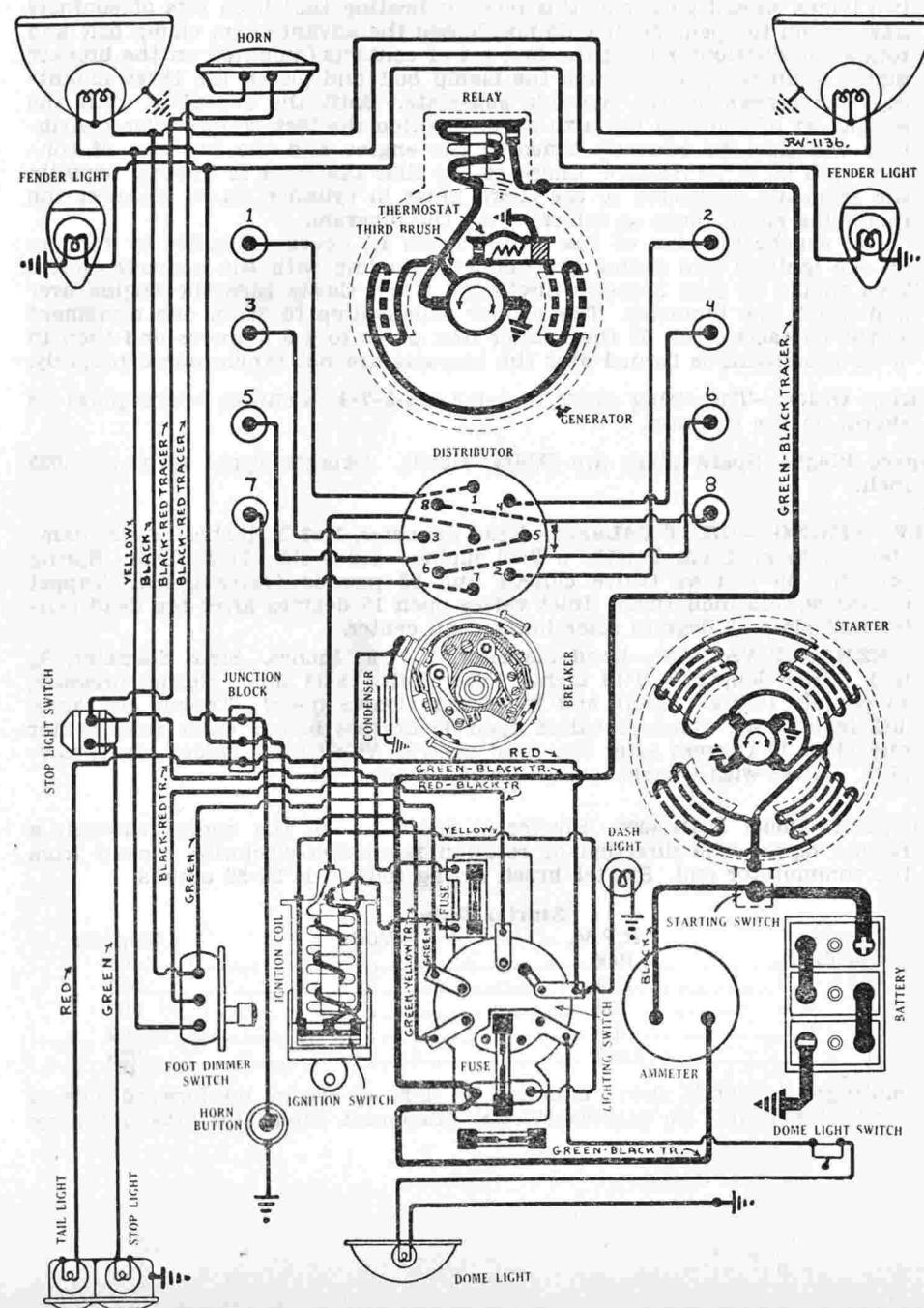
Distributor Model 660-A. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until gap is .022 inch with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. There are two sets of contacts operating on a single four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. The contacts must be synchronized to secure this firing interval for satisfactory engine performance. See Timing. Distributor is full automatic. Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 27 degrees reached at 2800 R.P.M. of the engine.

Mounting:—Distributor is mounted vertically at the rear of the engine between the cylinder banks. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with No. 3 grease and turn down one turn every two weeks or each 500 miles. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Contacts can be synchronized by using special Delco-Remy tool, Part No. 820738, and following complete directions in the Equipment Section. It is possible to synchronize the contacts without special equipment after the distributor has been timed to the engine by cranking the engine over 270 degrees when piston No. 2 will reach firing position when the flywheel mark '2&8/IGN' will be directly opposite the indicator in the peephole in the flywheel housing at the left of the engine. Loosen the two lock screws on the movable breaker plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the breaker gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 7 degrees (on the flywheel) before top dead center. To set timing, crank engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Turn engine over and stop when the flywheel mark 1&7/IGN' is directly opposite the indicator in the inspection hole in the left side of the flywheel housing (visible after taking up toeboard). This mark is 7 degrees or 49/64 inch before the top dead center mark 'DC/1-7'. Then loosen the advance arm clamp screw and rotate the distributor until the first set of contacts



OAKLAND

EIGHT MODEL 0/8 (1930) SERIAL NUMBERS 273500-08 UP
 PRODUCTION STARTED JANUARY 4, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

(mounted directly on the breaker plate) begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram. The second set of contacts (mounted on the movable breaker plate) open exactly 45 degrees after this point when piston No. 4 reaches firing position.

NOTE:—The upper clamp screw and indicator arm are used to make slight changes in the distributor setting. The normal setting is when the indicator is directly opposite the '0' mark on the scale. This is changed by loosening the clamp screw and shifting the arm.

Firing Order:—The firing order is 1-4-5-2-7-6-3-8 with cylinders numbered as shown on the diagram. This firing order is 1L-2R-3L-1R-4L-3R-2L-4R with cylinder No. 1 nearest the radiator and cylinder banks right and left as viewed from the driver's seat.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-12. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1½ inches. Stem diameter, 11/32 inch. Stem length, 5 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .011-.013 inch (hot). Inlet valves open at top dead center and close 40 degrees after lower dead center. The flywheel is marked at point of inlet opening for cylinders Nos. 1 and 2.

EXHAUST VALVES:—Head diameter, 1¾ inches. Stem diameter, 11/32 inch. Stem length, 5 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 100 pounds. Tappet clearance, .011-.013 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 15 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model 726-H (726-J—R.H. Drive).** Starter is connected to the engine through a Dyer manual pinion shift. The first movement of the starting pedal compresses two coil springs within a sleeve. These springs force the starter drive pinion in mesh with the engine flywheel gear. The further movement of the starting pedal closes the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	.5	65
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove starting pedal control rod. Then take out two flange mounting cap screws and nut on flange bolt. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the starter bearing oiler every month or each 1000 miles.

GENERATOR:—**Model 959-J.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 9-12 amperes (hot) reached at 1800-2000 R.P.M.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
18-20.....	8.0.....	1450	9-12..... 7.35-7.65..... 1800-2000

Brush spring tension is 14-18 ounces. Shunt field current is 4-6.1 amperes. Generator motoring draws 5.5-6 amperes at 6 volts.

Mounting:—Generator is flange mounted at front of engine between cylinder banks and is driven by the fan belt. To remove generator, disconnect lead and remove two flange mounting cap screws. Then lower generator and slip off drive belt. The generator and fan can then be lifted from place.

Belt Adjustment. The generator drive belt tension is adjusted by shifting the generator. To take up drive belt, loosen the two flange mounting screws and tilt the generator to the left around the left hand screw as a pivot. Tighten the mounting screws. The belt tension should be just sufficient to drive the generator and fan without slipping.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles of operation.

RELAY:—**Model 265-C.** Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—**Clum Switch Model 9067.** Lighting switch is mounted on the instrument panel. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are controlled by a dimmer switch mounted on the toeboard. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuses mounted on lighting switch are 20 ampere capacity.

OLDSMOBILE

MODEL F-30 (1930)

PRODUCTION STARTED DECEMBER 16, 1929
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WCB-13, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted under the driver's seat.

IGNITION:—Coil Model 528-P. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped.

Distributor Model 639-G. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is full automatic. Automatic advance begins at 400 R.P.M. (engine). Maximum automatic advance is 22 degrees reached at 2600 R.P.M.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft and turn down one half turn every month or each 1000 miles. At the same time, remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil and put a small amount of vaseline on the face of the breaker cam.

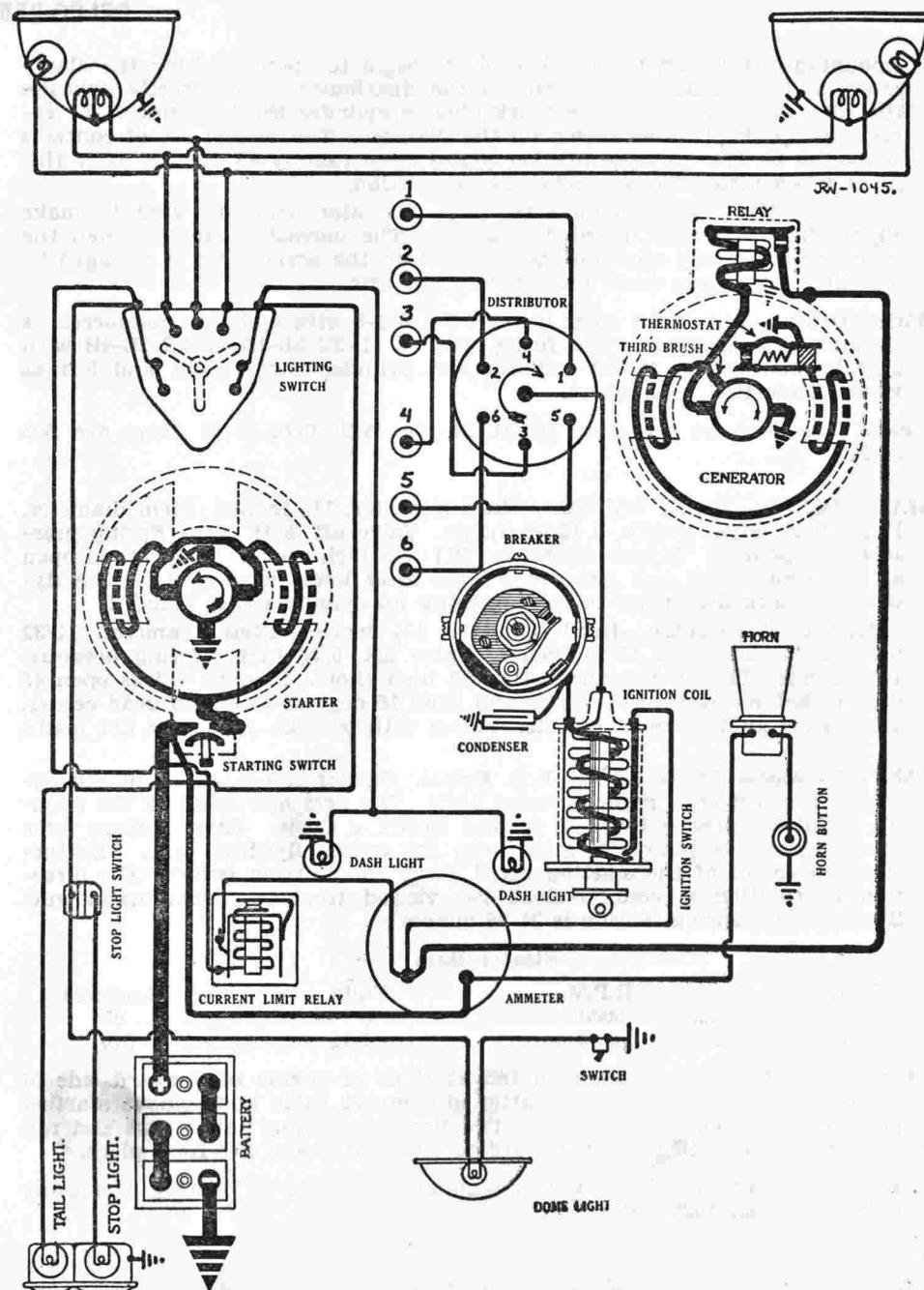
Timing:—Breaker contacts begin to open when piston entering power stroke reaches a position 8 degrees or .020-.030 inch before top dead center with breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Continue to crank engine until piston reaches firing position when the flywheel mark '0' will be in line with the indicator in the peephole in the front of the flywheel housing on the left of the engine. Loosen advance arm clamp screw and rotate distributor until contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are Metric A.C. Type G. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, 11/32 inch. Stem length, 5 1/8 inches (over all). Valve lift (with .010 inch lash), .320 inch. Spring pressure, 68 pounds compressed to 1 15/16 inches. Tappet clearance, .008 inch (hot) running and .010 inch when setting camshaft. Inlet valves open at top dead center (with .010 inch clearance) and close 50 degrees after lower dead center. The flywheel is marked '0' at the top dead center position.

EXHAUST VALVES:—Head diameter, 1 13/32 inches. Stem diameter, 3/8 inch. Stem length, 5 1/8 inches (over all). Valve lift, .320 inch. Spring pressure, 68 pounds compressed to 1 15/16 inches. Tappet clearance, .008 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Oversize



OLDSMOBILE

MODEL F-30 (1930)

PRODUCTION STARTED DECEMBER 16, 1929
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

valves are not made.

STARTER:—Model 714-H. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 125 R.P.M. drawing 130 amperes at 5.5 volts. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	5000	5	65
12 "	Lock	3.63	475

Mounting:—Starter is flange mounted at left of engine on forward side of fly-wheel housing. To remove starter, disconnect cable and remove starter pedal link pin. Then remove flange mounting cap screws, pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-W. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 170°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, maximum charging rate is 19-21 amperes (cold) reached at 1450 R.P.M. or approximately 25 M.P.H.

Generator Data

Amperes	Cold Test		Hot Test		
	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and remove inspection cover on front of chain case. Then remove flange mounting cap screws and slide generator to the rear. Tie up the timing chain to prevent it slipping off camshaft sprocket and throwing the engine out of time.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the generator every month or each 1000 miles. The drive end bearing is oiled by splash from the chain case.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 650 R.P.M. or 12 M.P.H. when the generator voltage reaches 7-7.5 volts and open at 575 R.P.M. or 9.5 M.P.H. with a discharge current of 1-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-B. Lighting switch is mounted at the lower end of the steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, tail, side and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current reaches 20-30 amperes and continues limiting the current to 2-15 amperes. Contact gap is .012-.030 inch. Air gap is .019-.025 inch.

ACCESSORIES:—Horn is Klaxon Model 18-B. Stop light switch is Delco-Remy Model 466-A.

PEERLESS

STANDARD EIGHT MODEL A (1930)
PRODUCTION STARTED NOVEMBER 23, 1929
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—Willard, Type WSB-15, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 105 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model CE-4013. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

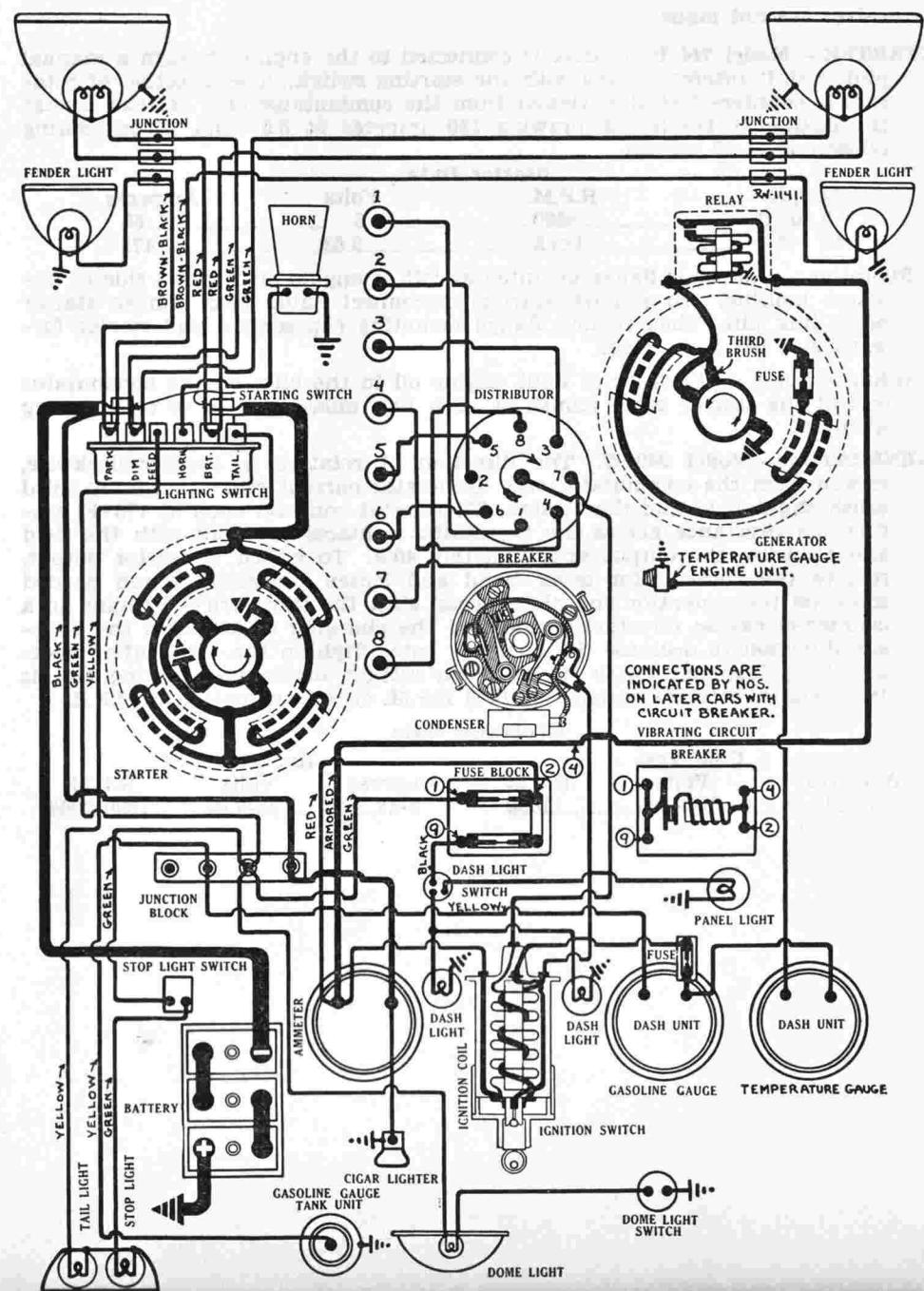
Distributor Model IGH-4011-A. Breaker contacts separate .018-.020 inch. Set contact gap by loosening the two lock screws on the stationary contact mounting plate (first set mounted on breaker plate) and turn eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. The second set (mounted on movable sub-plate) is adjusted by loosening the lock nut on the stationary contact stud and turning up the stud. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Maximum automatic advance is 15 degrees (engine) reached at 1450 R.P.M. of engine. The engine is designed to operate with the manual spark control button in the advanced position (pushed all the way inward toward the dash). Pulling out the button provides an auxiliary retard for hand starting. Breaker has two sets of contacts operating on a four lobe cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on rear of generator at right of engine and is gear driven from the armature shaft. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out mounting screw in advance arm and lift distributor from place.

Oiling:—Put 6 to 8 drops of light engine oil in the oiler on the side of the distributor head every 500 miles of operation. At the same time remove the distributor head and rotor and put 3 or 4 drops of oil in the oiler in the center of the shaft and put one drop of oil on the breaker arm pivot pins. Every 5000 miles put a small bit of grease on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Auto-Lite tool and follow complete directions given in Equipment Section. Contacts can be synchronized after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position ($\frac{1}{8}$ inch on flywheel before top dead center). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and shift plate until contacts begin to open. Tighten the lock screws.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position $\frac{1}{8}$ inch (on the flywheel) before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). See that spark control button is fully advanced (pushed all the way in toward the dash) and remove inspection hole cover plate (in flywheel case at right of engine). Continue to turn engine over until the ignition mark 'IGN' on the flywheel is directly opposite the indicator in the edge of the inspection hole. Then loosen advance



PEERLESS

STANDARD EIGHT MODEL A (1930)
PRODUCTION STARTED NOVEMBER 23, 1929
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment in the distributor head connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion Type 10. Gaps are .027 inch.

VALVE TIMING:—To set valve timing, crank engine over until piston No. 1 reaches top dead center with the flywheel mark 'DC1&8' directly opposite the indicator in the inspection hole in right side at the top of the flywheel housing. Then turn camshaft until there are exactly 13 links in the timing chain between the small 'o' stamped on the crankshaft sprocket and the camshaft sprocket when the timing chain is assembled. To check setting, first set tappet clearance at .007 inch and turn engine over until exhaust valve in cylinder No. 1 just closes. The flywheel mark 'No.1 EX.CL' should be directly opposite the indicator in the inspection hole. Tappet clearance of intake and exhaust valves should be .007 inch.

STARTER:—Model MAB-4029. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 28-36 ounces. Starter switch is mounted at lower end of steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		.100
3.5 "	1100		.200
6.6 "	700		.300
10.2 "	410		.400
24 "	Lock	4	.725

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the armature every 1000 miles of operation.

GENERATOR:—Model GAL-4126. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush and mounting plate are held in position by

friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16-18 amperes (cold) at 8 volts reached at 2025 R.P.M. or 25-30 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2025
14	7.65	2925

Shunt field current is 4.2 amperes at 6 volts. Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts.

Mounting:—Generator is flange mounted at right of engine. To remove generator, first disconnect all ignition wiring or remove distributor. Then disconnect generator lead and take out flange mounting screws. Pull generator to rear to disengage coupling and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the generator every 500 miles of operation. Every 5000 miles remove the grease cup directly under the bearing retainer on the commutator end of the generator and repack with light grease.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 10-11 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 1-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contact closed.

LIGHTING:—Aid Lighting Switch. Switch is of 'Finger Tip Control' type and incorporates a lighting switch, starting switch and horn button in one unit mounted at the lower end of the steering column and controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Lighting fuses mounted on fuse block on dash (first cars) are 20 ampere capacity. A 20 ampere capacity fuse is mounted on the back of the gasoline gauge.

CURRENT LIMIT RELAY:—This device is a vibrating circuit breaker used instead of fuses in the lighting circuit on later cars. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to a 15 ampere maximum.

PEERLESS

MASTER EIGHT MODEL B (1930)

CUSTOM EIGHT MODEL C (1930)

PRODUCTION STARTED NOVEMBER 23, 1929

AUTO-LITE GENERATING, STARTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—Willard, Type WSB-19, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 140 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model CE-4013. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1.5 amperes at 6 volts with engine running and 4.5 amperes at 6 volts with engine stopped.

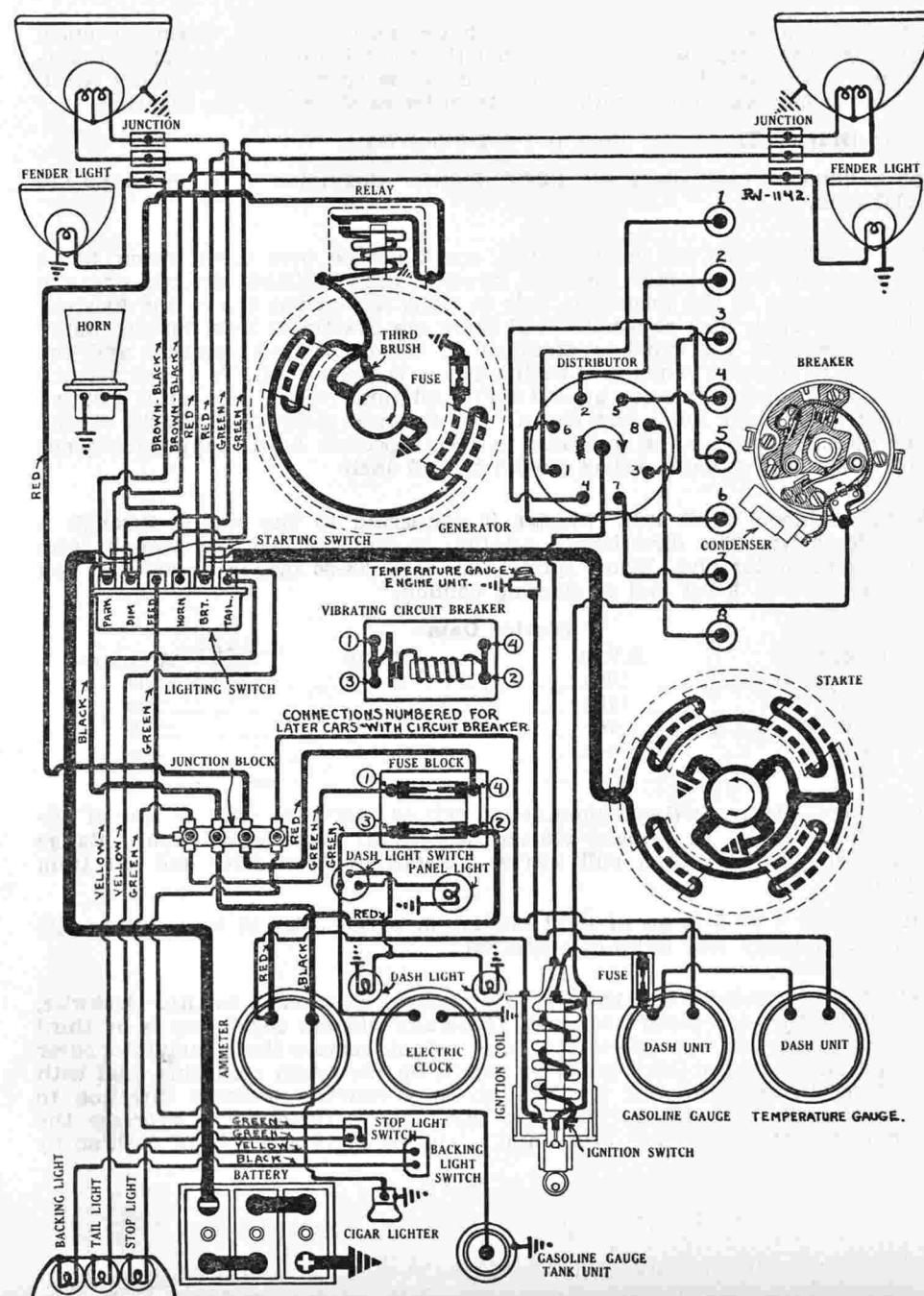
Distributor Model IGH-4010. Breaker contacts separate .018-.020 inch. Set contact gap by loosening two lock screws on stationary contact mounting plate (first set mounted on breaker plate) and turning eccentric adjusting screw until gap is .020 inch with breaker arm on lobe of cam. The second set (mounted on movable sub-plate) is adjusted by loosening the lock nut on the stationary contact mounting stud and turning up the stud. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Maximum automatic advance is 15 degrees (engine) reached at 1450 R.P.M. of engine. The engine is designed to operate with the manual spark fully advanced (with the button pushed all the way in toward the dash). Pulling out the button provides an auxiliary retard. Breaker has two sets of contacts operating on a single four lobe cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. This firing interval must be accurately set by synchronizing contacts for satisfactory engine performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and may be removed from the right side. To remove distributor, disconnect manual spark control and primary lead and remove distributor head with cables intact. Then take out mounting screw in advance arm and lift distributor from place.

Oiling:—Put 6 or 8 drops of light engine oil in the oiler on the side of the distributor every 500 miles of operation. At the same time remove the distributor head and rotor and put 3 or 4 drops of oil in the oiler in the center of the shaft and put one drop of oil on the breaker arm pivot pins. Every 5000 miles put a small bit of grease on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Auto-Lite tool and follow complete directions given in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position ($\frac{3}{4}$ inch on the flywheel before top dead center with the manual spark control fully advanced). If the second set of contacts (mounted on movable sub-plate) do not open at this point, loosen the two lock screws and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position $\frac{3}{4}$ inch (on the flywheel) before top dead center with the spark control button fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). See that spark control button is pushed all the way in toward the dash and remove inspection hole cover in



PEERLESS

MASTER EIGHT MODEL B (1930)

CUSTOM EIGHT MODEL C (1930)

PRODUCTION STARTED NOVEMBER 23, 1929

AUTO-LITE GENERATING, STARTING SYSTEM

AUTO-LITE IGNITION

'IGN' on the flywheel is directly opposite the indicator on the edge of the inspection hole. Then loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted directly on the breaker plate) begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment in the distributor head connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion Type 9. Gaps are .027 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 55/8 inches. Stem diameter, .3710-.3715 inch. Stem length, 4 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 105 pounds. Tappet clearance, .007 inch. Inlet valves open 2 degrees after top dead center and close 47 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, .3710-.3715 inch. Stem length, 4 13/16 inches. Valve lift, 5/16 inch. Spring pressure, 105 pounds. Tappet clearance, .007 inch. Exhaust valves open 47 degrees before lower dead center and close 2 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are made for replacement.

To Set Valve Timing:—Crank engine over until piston No. 1 reaches top dead center when the flywheel mark 'DC 1&8' will be directly opposite the indicator in the inspection hole in the left front of the flywheel housing. Then turn camshaft so that there will be 10 links between the small 'o' stamped on the crankshaft sprocket and the camshaft sprocket when the chain is installed. To check timing, set No. 1 exhaust tappet clearance at .007 inch and crank engine over until No. 1 exhaust valve has just closed. The flywheel mark 'No.1 EX.CL.' should be directly opposite the indicator.

STARTER:—Model ML-4146. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush tension is 20-24 ounces. The starting switch is mounted at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	.55	50
1.1 "	1940	.55	100
4.3 "	1050	.50	200
7.8 "	650	.45	300
11.4 "	350	.35	400
16 "	Lock	.30	560

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out flange mounting screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the armature every 1000 miles of operation.

GENERATOR:—Model GAR-4011. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third

brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush and mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 16-18 amperes (cold) at 8 volts reached at 2075 R.P.M. or 25-30 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	.64	675
6	.69	835
10	.73	1025
14	.765	1275
17.2	.80	2075
14	.765	2925

Shunt field current is 4.2 amperes at 6 volts. Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. A 7.5 ampere field fuse is mounted on the end plate.

Mounting:—Generator is mounted by special flange mounting at left of engine and is driven by the fan belt. To remove generator, disconnect lead and take out bolts in mounting flange under generator field frame. Then slip off drive belt and lift generator from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the generator every 500 miles of operation. Every 5000 miles remove the grease cup under the bearing retainer on the commutator end of the generator and fill with light grease.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. or 10-11 M.P.H. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 1-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—**Aid Lighting Switch.** The switch is of the 'Finger Tip Control' type and incorporates the lighting switch, starting switch and horn button in a single unit mounted at the lower end of the steering column and controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87.

FUSES:—Generator field fuse is 7.5 ampere capacity. Lighting fuses mounted on fuse block on dash (first cars) are 20 ampere capacity. A 20 ampere capacity fuse is mounted on the back of the gasoline gauge.

CURRENT LIMIT RELAY:—This device is a vibrating circuit breaker installed in later cars instead of the lighting fuses. It begins to vibrate when the current in the lighting circuits reaches 25-30 amperes and continues limiting the current to 15 amperes maximum.

PIERCE ARROW

MODELS A AND B (1930)
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-5, 6 volt, 140 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 145 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 528-E (2 used). Coils are mounted on the dash. Ignition current is 3.6 amperes at 6 volts with engine running and 8 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

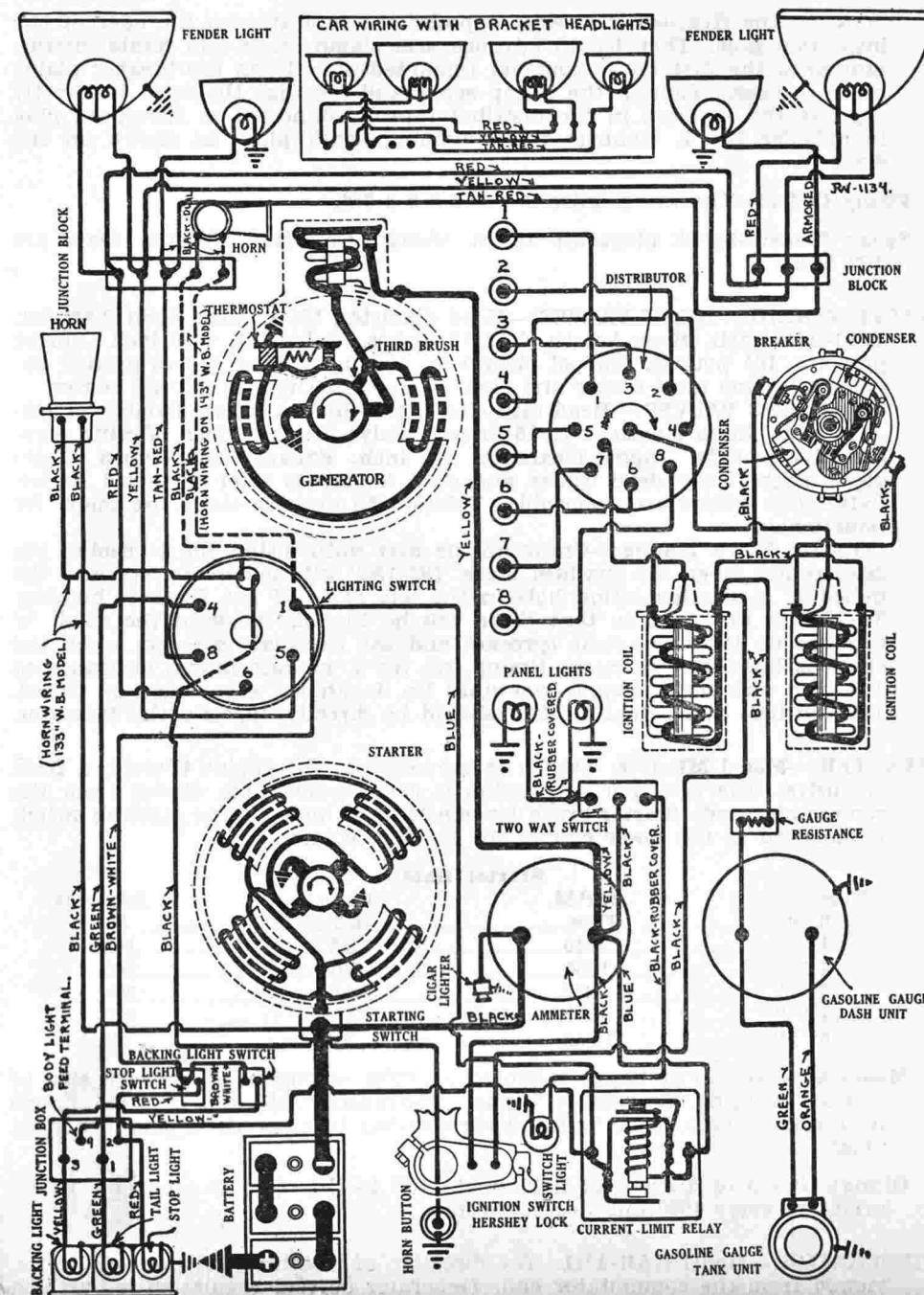
Distributor Model 668-E. Breaker contacts separate .018 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind contacts and turning up eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 35 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 3300 R.P.M. Breaker has two sets of contacts operating on a four sided cam. Each set of contacts controls one coil and fires the spark plugs in four cylinders. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for satisfactory ignition performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head and can be removed from the right side. To remove distributor, disconnect primary leads and spark control and remove distributor head with cables intact. Then take off three nuts on base mounting studs and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down two full turns every 2500 miles. At the same time remove the distributor head and rotor and put 8 or 10 drops of light engine oil in the wick oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam.

Timing:—**Synchronization of Contacts.** Contacts must be synchronized so that the set mounted on the movable sub-base open exactly 45 degrees after the first set, which is mounted directly on the breaker base plate. To synchronize contacts use special Delco-Remy tool, Part No. 1835009, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to engine by cranking engine over exactly 90 degrees from firing position of piston No. 1 when piston No. 6 will reach firing position. If the second set of contacts do not open at this point, loosen the two lock screws on the mounting sub-base and turn the eccentric adjusting screw until they begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 degrees on the fly-wheel before top dead center with the manual spark control lever in the fully advanced position (vertical). To set timing, crank engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Fully advance spark control lever and take off cover plate in fly-wheel inspection opening. Then crank engine over until the ignition mark



PIERCE ARROW

MODELS A AND B (1930)

PRODUCTION STARTED JANUARY 1, 1930

DELCO-REMY GENERATING, STARTING SYSTEM

DELCO-REMY IGNITION

on the flywheel is directly opposite the indicator on the housing. Loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted directly on the base plate) begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment in the distributor head connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 4-S. Gaps are .028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{21}{32}$ inches. Stem diameter, .3725 inch. Valve lift, .359 inch. Tappet clearance, .004 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{9}{16}$ inches. Stem diameter, .3715 inch. Valve lift, .359 inch. Tappet clearance, .006 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 728-C. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
1 "	1500	5.5	100
4.8 "	725	5.4	200
9.3 "	425	4.5	300
15.8 "	250	4.1	400
20 "	200	3.6	500
28 "	Lock	3.0	600

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and remove three flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 2500 miles. Once each year remove the grease plug in the reduction gear case and repack gears with medium grease.

GENERATOR:—Model 927-F. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F . cutting the re-

sistance connected across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the outside of the commutator end plate. Then shift the third brush by hand in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the lock screw after making the adjustment. With standard car setting, the maximum charging rate is 22 amperes at 8.5 volts reached at 1600 R.P.M. of generator or 26 M.P.H.

Generator Data

Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
20-22	8.5	1600	12-14

Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is flange mounted at the left front of the engine and is driven by the fan belt. To remove generator, disconnect lead and take off drive belt. Then remove flange mounting screws and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every 2500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at approximately 7 miles per hour when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-D. Lighting switch is mounted at the lower end of the steering column. Headlight equipment includes headlights mounted on the fenders and auxiliary lights mounted on brackets, or bracket headlights with the auxiliary lights on the fenders. In either installation the headlights are fitted with double filament bulbs using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Auxiliary lights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda 63. Tail light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda 1129. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current reaches 20-30 amperes and continues to operate limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

PIERCE ARROW

MODEL C (1930)

PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-5, 6 volt, 140 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 145 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 26 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 528-E. Coil is mounted on the dash. Ignition current is 1.8 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

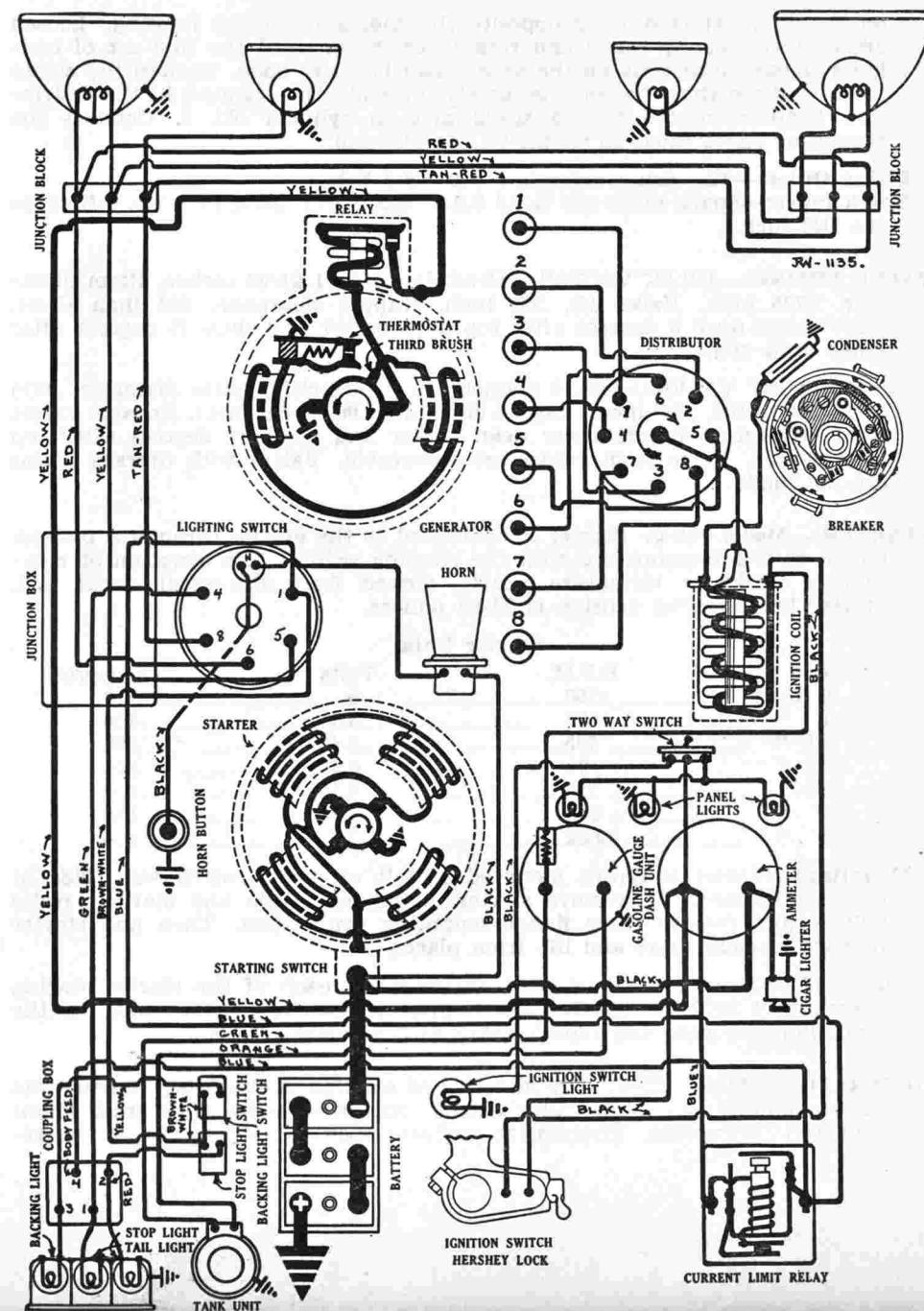
Distributor Model 652-E. Breaker contacts separate .018 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind contacts and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 33 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2600 R.P.M. of engine. Distributor has two sets of contacts operating on a four sided cam. Contacts open alternately at intervals of 45 degrees corresponding to the 90 degree firing interval of the engine. Contacts must be synchronized for correct ignition performance. See Timing.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down two full turns every 2500 miles. At the same time remove the distributor head and rotor and put 8 or 10 drops of light engine oil in the oiler in the center of the shaft and put a small bit of vaseline on the face of the breaker cam.

Timing:—Synchronization of Contacts. The contacts must be synchronized so that the set mounted on the movable sub-base open exactly 45 degrees after the set mounted directly on the breaker plate for satisfactory engine performance. To synchronize contacts, use special Delco-Remy tool, Part No. 820738, and follow complete directions given in Equipment Section. The contacts may be synchronized without special equipment after the distributor has been timed to the engine by cranking the engine over exactly 90 degrees from the firing position of piston No. 1 when piston No. 6 will reach firing position. If the second set of contacts are not opening at this point, loosen the two lock screws on the movable sub-base and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap with the breaker arm on the lobe of the cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when the piston entering power stroke reaches a position 5 degrees on the flywheel before top dead center with the manual spark control lever in the fully advanced position (vertical). To set timing, crank engine over until No. 1 piston enters compression stroke (the up stroke with both valves closed). Fully advance spark control lever and take off cover plate in flywheel inspection opening. Then crank engine over until the ignition mark



PIERCE ARROW
MODEL C (1930)
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

on the flywheel is directly opposite the indicator on the housing. Loosen advance arm clamp screw and rotate distributor until the first set of contacts (mounted directly on the base plate) begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment in the distributor head connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 4-S. Gaps are .028 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 21/32 inches. Stem diameter, .3725 inch. Valve lift, .359 inch. Tappet clearance, .004 inch (hot). Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, .3715 inch. Valve lift, .359 inch. Tappet clearance, .006 inch (hot). Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 728-C. Starter is connected to the engine through a manual shift interconnected with the starting switch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	2500	5	70
1 "	1500	5.5	100
4.8 "	725	5.4	200
9.3 "	425	4.5	300
15.8 "	250	4.1	400
20 "	200	3.6	500
28 "	Lock	3.0	600

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and return spring. Then remove three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every 2500 miles. Once each year remove the grease plug in the reduction gear case and repack gears with medium grease.

GENERATOR:—Model 959-F. The direction of rotation is clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the re-

sistance connected across the thermostat contacts in series with the field and reduce the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed lock screw on the outside of the commutator end plate. Then shift the third brush by hand in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the lock screw after making the adjustment. With standard car setting, the maximum charging rate is 22 amperes at 8.5 volts reached at 1600 R.P.M. or 26 M.P.H.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
20-22.....	8.5.....	1600	12-14.....	7.75.....	1800

Shunt field current is 5 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is flange mounted at the left front of the engine and is driven by the fan belt. To remove generator, disconnect lead and take off drive belt. Then remove flange mounting screws and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every 2500 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay closes at 7 miles per hour when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-D. Lighting switch is mounted at the lower end of the steering column. Headlight equipment includes headlights mounted on fenders with auxiliary lights mounted on brackets, or bracket headlights with auxiliary lights mounted on the fenders. In each installation the headlights are fitted with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Auxiliary headlights are 6-8 volt, 6 cp. S.C. Mazda 81. Dash lights are 6-8 volt, 3 cp. S.C. Mazda 63. Tail light is 6-8 volt, 6 cp. S.C. Mazda 81. Stop and backing lights are each 6-8 volt, 21 cp. S.C. Mazda 1129. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Corner lights are 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to operate when the current reaches 25-30 amperes and continues to vibrate limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

PLYMOUTH
MODEL U (1929-30)
PRODUCTION STARTED MARCH 1, 1929
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSB-13, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16.8 hours. Battery is mounted on the left frame member under the front floor boards.

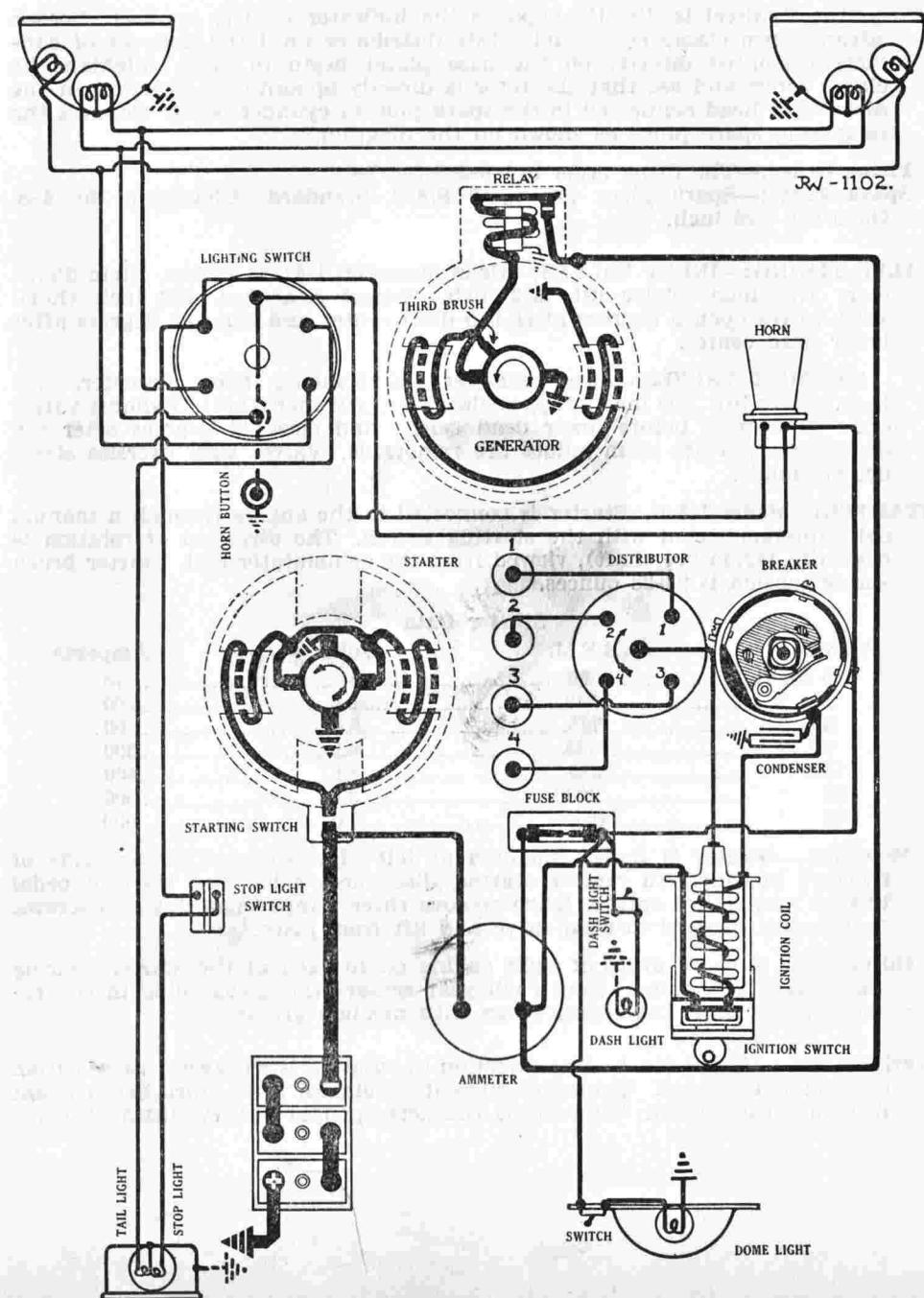
IGNITION:—Coil Model 526-S, 526-Z. The ignition switch is built in the base of the coil. Coil is mounted on the back of the dash with the ignition switch extending through to the face of the instrument panel. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 635-T, 635-W. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock nut on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2400 R.P.M. Breaker arm spring tension is 17-21 ounces.

Mounting:—Distributor is mounted at the front of the engine and is driven by a gear on the end of the camshaft. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Then take out two mounting bolts in distributor bracket and lift the distributor and bracket from place.

Oiling:—Fill the grease cup on the side of the distributor housing with medium cup grease and turn down two turns every month or each 1000 miles of operation. Keep the oiler on the distributor drive gear compartment filled with light engine oil.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .050 inch before top dead center with the spark control lever in the fully advanced position. To set timing, it will be necessary to use a micrometer gauge to determine the piston position. Remove the spark plug in cylinder No. 1 and screw the gauge in place. Connect one lead of a six volt test lamp to the primary terminal of the distributor and connect the other lead to the relay terminal of the generator. If the battery is out of the car, connect this test lamp lead to one terminal of a battery and ground the other battery terminal to the car frame. With these connections the test lamp will burn while the breaker contacts are closed and will go out as the contacts open. Turn the engine over until piston No. 1 reaches top dead center and set the micrometer gauge at zero. Then crank the engine over until piston No. 1 enters compression stroke. Make certain that the manual spark control is in the fully advanced position. Crank the engine until the gauge indicates that the piston has reached a position .050 inch before top dead center. Loosen the advance arm clamp screw and rotate the distributor until the test lamp goes out, indicating that the contacts have opened. Tighten the clamp screw and check to see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1. To check the ignition setting, crank the engine over several times and then with piston No. 1 on compression stroke slowly crank the engine over until the lamp goes out, indicating that the contacts have opened. If the gauge reading is within limits of .045-.055 inch on the stan-



PLYMOUTH

MODEL U (1929-30)

PRODUCTION STARTED MARCH 1, 1929
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

dard compression engine with compression ratio of 4.6 to 1, the ignition setting is satisfactory. If the gauge reading is outside these limits, the operation must be repeated.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps should be .027-.030 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 23/32 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 4 $\frac{1}{8}$ inches. Valve lift, 9/32 inch. Spring pressure, 56 pounds (valve open) and 40 pounds (valve closed). Tappet clearance, .005 inch (hot). Inlet valves open 5 degrees past top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 19/32 inches. Stem diameter, $\frac{3}{8}$ inch. Stem length, 4 $\frac{1}{8}$ inches. Valve lift, 9/32 inch. Spring pressure, 56 pounds (valve open) and 40 pounds (valve closed). Tappet clearance, .006 inch (hot). Exhaust valves open 49 degrees before lower dead center and close 3 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 714-J, 714-Q. Starter is connected to the engine through a Bendix drive (Model 714-J) or a manual pinion shift interconnected with the starting switch and an overrunning clutch (Model 714Q). The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces. Starter switch used with Model 714-J starter is Model 404-Z. The starting switch is part of the starter assembly on the Model 714-Q.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5.....	65.....
12 ".....	Lock.....	3.63.....	475.....

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage (714-Q) and remove two flange mounting cap screws. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at the commutator end of the starter every month or each 1000 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 947-B. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust charging rate, loosen the small round headed screw on the commutator end plate and shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	800	0	6.4	850
5.6	7.0	1000	6	7.0	1250
11.6	7.4	1325	9.4	7.4	1625
15	8.0	1900	11.0	7.55	2125
13.2	7.8	2500	10	7.45	2750

Generator brush spring tension is 14-18 ounces. Shunt field current is 3.5-5.1 amperes at 6 volts. Generator motoring draws 5.5 amperes at 6 volts.

Mounting:—Generator is cradle mounted at the front of the engine. The fan is mounted on the forward end of the generator shaft. The generator and fan assembly is belt driven from the crankshaft. To remove generator, disconnect the generator lead and loosen the generator cradle stud nut (the large nut directly under the generator which holds the generator cradle in place). Lower the generator and slip off the drive belt. Loosen the nut on the generator clamp band and slide the generator from place.

Belt Adjustment. The driving belt tension is adjusted by loosening the cradle mounting nut and prying up on the generator until the proper belt tension is secured. The belt should not be any tighter than is necessary to drive the generator and fan without slipping. Excessive tension will cause wear in the generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 7.25 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 8821. Lighting switch is mounted at lower end of steering column. Double filament headlights using a second 21 cp. filament are standard equipment. The tail and stop light is a double filament bulb and the attachment plug must be inserted so that the tail lamp lead is connected to the 3 cp. filament. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash light is 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 15 cp. S.C. Mazda 87. Tail and stop light is 6-8 volt, 3-21 cp. D.C. Mazda 1158.

FUSES:—Lighting fuse mounted on the dash is 20 ampere capacity.

PONTIAC

MODEL P/6 (1930) SERIAL NUMBERS 591,501-P UP
 PRODUCTION STARTED JANUARY 4, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

BATTERY:—Delco or Willard, Type WSB-13, 6 volt, 13 plates. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 526-R. The ignition switch is built in the base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 2 amperes at 6 volts with engine running and 5 amperes at 6 volts with engine stopped.

Distributor Model 639-U. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until breaker gap is .022 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is of the full automatic type. Automatic advance begins at 500 R.P.M. of engine. Maximum automatic advance is 24 degrees reached at 2600 R.P.M. of the engine.

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and remove distributor head with cables intact. Then take out the lock nut and mounting screw on the side of the engine block between cylinders Nos. 3 and 4 and remove the hold-down screw in the advance arm. Then lift distributor from place.

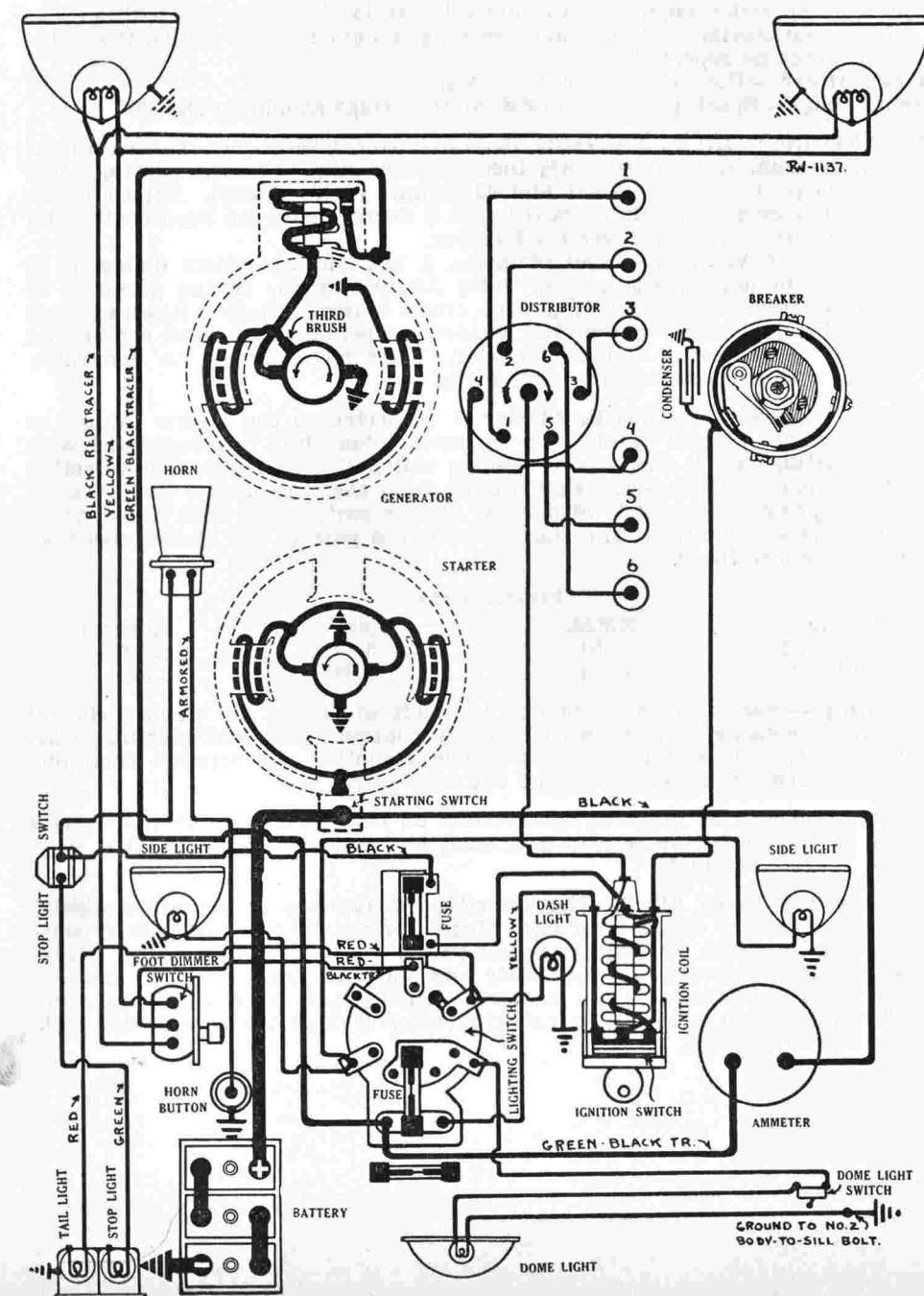
Oiling:—Fill the grease cup on the side of the distributor with No. 3 soft cup grease and turn down one full turn every two weeks or each 500 miles of operation. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil and put one drop of oil on the breaker arm pivot pin. Put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 4 degrees (on the flywheel) before top dead center. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Turn engine over until piston reaches firing position when the ignition mark '1&6/IGN' on the flywheel is directly opposite the indicator on the flywheel case. This mark is 4 degrees before the top dead center mark '1&6/UDC'. Then loosen the advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-14. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 13/32 inches. Stem diameter, 5/16 inch. Stem length, 3 1/8 inches. Valve lift, 5/16 inch. Spring pressure, 55 pounds. Tappet clearance, .007-.009 inch. Inlet valves open 7 degrees past top dead center and close 39 degrees past lower dead center. The flywheel is marked 'IN.OP./1&6' at the point of inlet opening of cylinder No. 1.



PONTIAC

**MODEL P/6 (1930) SERIAL NUMBERS 591,501-P UP
PRODUCTION STARTED JANUARY 4, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION**

EXHAUST VALVES:—Head diameter, 1 11/32 inches. Stem diameter, 5/16 inch. Stem length, 3 1/8 inches. Valve lift, 5/16 inch. Spring pressure, 55 pounds. Tappet clearance, .007-.009 inch (hot). Exhaust valves open 42 degrees before lower dead center and close at top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 714-R. Starter is connected to the engine through a Dyer manual pinion shift. The first movement of the starting pedal compresses two springs within a sleeve mounted on the starter shaft. These springs force the starter drive pinion in mesh with the flywheel gear. The further movement of the pedal closes the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5.....	65.....
12 ".....	Lock.....	3.63.....	.475.....

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every month or each 1000 miles. The drive end bearing is oilless.

GENERATOR:—Model 943-JX. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 17 amperes (cold) reached at 1700 R.P.M. or 25 miles per hour.

Generator Data

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
16-18.....	8.2.....	1700.....	11-13.....	7.55-7.85.....	1750-1850.....

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 3.5-4.5 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at left of engine by special swinging bracket. To remove generator, disconnect lead and loosen adjustment clamp arm bolt. Swing generator toward engine and slip off drive belt. Then take out two bolts holding generator on bracket and lift from place.

Belt Adjustment. To tighten fan belt, loosen adjustment clamp arm bolt and swing generator out from engine until proper belt tension is secured. Then tighten bolt. Be careful not to get the belt too tight or it will cause excessive wear of generator bearings.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

RELAY:—Model 265-H. Relay is mounted on the generator. Relay contacts close at 575 R.P.M. or 7-10 M.P.H. when the generator voltage reaches 6.75-7.5 volts and open with a discharge current of 0-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Clum Switch Model 9067. Lighting switch is mounted on the instrument panel. Double filament headlights are used. They are controlled by the dimmer switch mounted on the toeboard. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side, dash, tail and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuses mounted on the switch are 20 ampere capacity.

REO
MODEL 15 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type RSB-13, 6 volt, 90 ampere hour. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on the left frame member.

IGNITION:—Coil Model 528-E. Coil is mounted on the dash. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model 641-D. Breaker contacts separate .020 inch. Set contact gap by loosening lock screw on stationary contact mounting plate directly behind breaker arm and turning eccentric adjusting screw until correct gap is obtained with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 900 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 3000 R.P.M. The ignition switch is a Type 5-B Electrolock.

Mounting:—The Electrolock must be disconnected at the dash and removed as a unit with the distributor whenever the distributor is taken off the engine. To remove distributor, disconnect manual advance rod and primary lead and remove distributor head with cables intact. Then take out the stop screw in the manual advance arm and lift the distributor from place. This will not disturb the timing and it will only be necessary in reassembling to make certain the tongue on the distributor shaft enters the groove in the drive shaft. The tongue is offset so that it can not be assembled incorrectly.

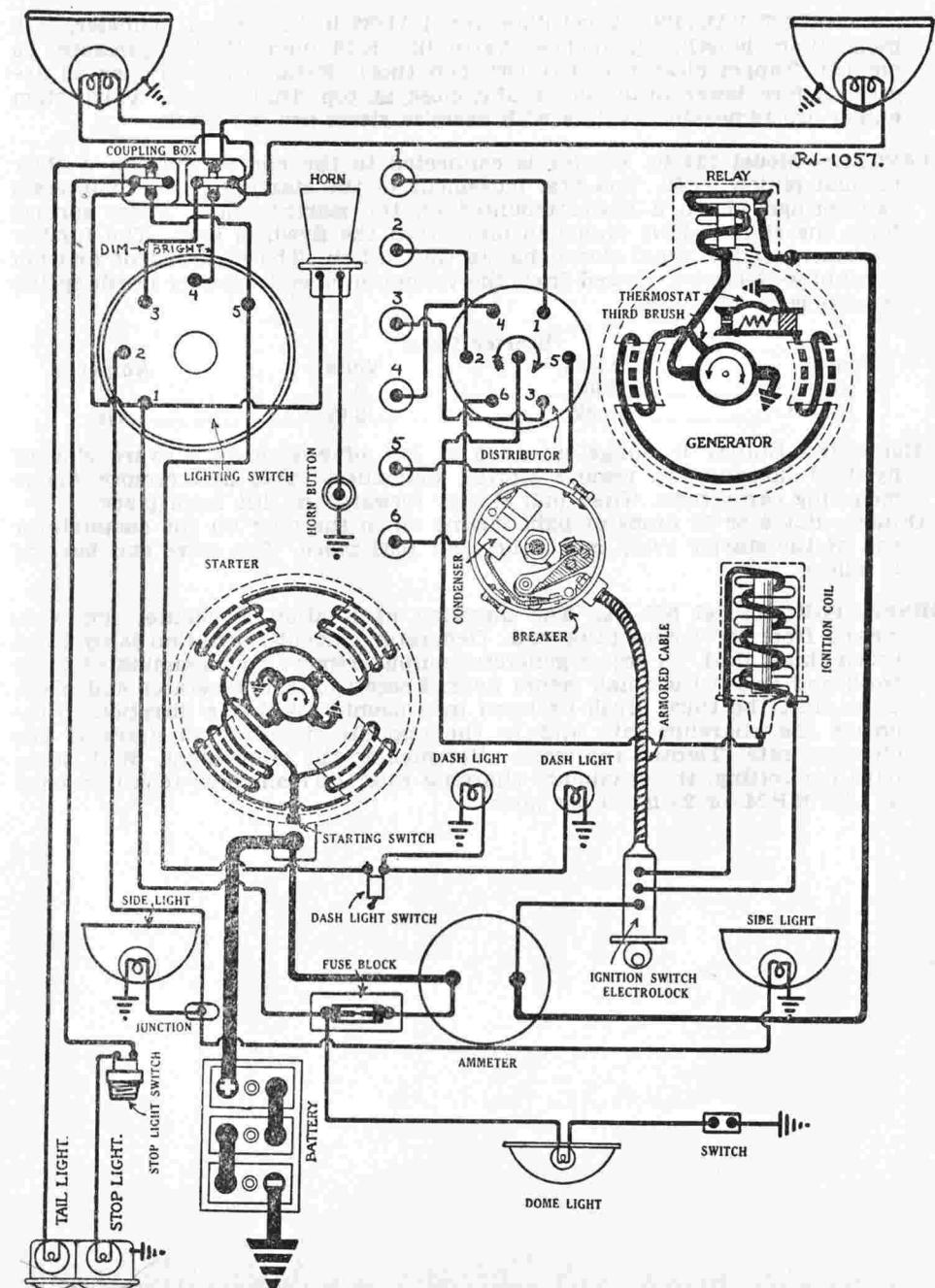
Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every month or each 1000 miles. Every 2000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position one-half inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control. Remove the inspection cover on the flywheel case and continue to crank engine until the flywheel mark 'UDC' is one half inch before the mark on the housing. Then take off distributor cap and loosen the advance arm clamp screw. Rotate the distributor until the contacts begin to separate. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head. There is a small plug in the cylinder head directly above piston in cylinder No. 6. If a timing gauge is available this plug should be removed and the timing gauge screwed into the opening. The engine can then be timed with piston No. 1 on compression stroke but piston position is gauged in cylinder No. 6.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .025 inch.

VALVE TIMING:—Inlet valves open at top dead center. To set valve timing, first check tappet clearance. This should be .005 inch (inlet) and .007 inch (exhaust) with engine hot. Then crank engine over until piston No. 6 enters compression stroke. Take out the small pipe plug in the cylinder head



REO
MODEL 15 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

directly over piston No. 6 and determine compression stroke by holding the thumb over the hole until compression is felt. Then insert a wire in the hole and crank engine over until piston reaches top dead center when the upward movement of the wire will cease or remove inspection hole cover in flywheel housing and crank engine until the flywheel mark 'UDC' is directly opposite the mark in the housing. Inlet valve in cylinder No. 1 should begin to open at this point. The crankshaft sprocket and the camshaft sprocket are marked to aid in setting valve timing. There should be eleven links in the timing chain between the marks on the two sprockets.

STARTER:—Model 726-E. Starter is connected to the engine through a mechanical pinion shift interconnected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5.....	65.....
15 ".....	Lock.....	3.15.....	.570.....

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect pedal rod linkage and cable and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of oil in the bearing oiler every month or each 1000 miles.

GENERATOR:—Model 955-L. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the oppo-

site direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting maximum charging rate is 19 amperes (cold) reached at 1450 R.P.M. or 25 miles per hour.

Generator Data			
Cold Test		Hot Test	
Amperes	Volts	R.P.M.	Amperes
19-21.....	8.5.....	1450.....	9-12.....
Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is			7.35-7.65.....
4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.			1800-2000.....

Mounting:—Generator is flange mounted at right of engine on rear of timing chain case. To remove generator, disconnect lead and take out two flange mounting cap screws. Then pull generator to rear and lift from place.

Adjustment of Timing Chain:—Timing chain is adjusted by shifting the generator. To adjust chain, loosen the flange mounting screws and turn up the adjusting set screw until the chain begins to hum with the engine running. Then back off the set screw until the chain runs noiselessly and tighten the mounting screws.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 8-10 M.P.H. when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 3 amperes. Contacts separate .015-.025 inch. Air gap is .014-.021 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 482-F. Lighting switch is mounted at lower end of steering column. Headlights are double filament using the second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 3 cp. D.C. Mazda 64.

FUSES:—Lighting fuse mounted on block on dash is 20 ampere capacity.

REO
MODELS 20 AND 25 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJRR-4, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours.

IGNITION:—Coil Model 528-E. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes at 6 volts with engine stopped. Ignition coil is mounted on the dash.

Distributor Model 640-S. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper clearance is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 900 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 3000 R.P.M. of the engine. Ignition switch is Delco-Remy Dual-lock Model 425-C.

Mounting:—Ignition coil is mounted on the dash. Distributor is mounted on cylinder head and is driven by spiral gears from the camshaft. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with high tension cables intact. Then loosen distributor clamp screw and lift distributor from place.

Oiling:—Refill the grease cup under the distributor head with medium cup grease and turn down two turns every month or each 1000 miles. Put a small amount of vaseline on the face of the breaker cam under the fiber bumper of the contact arm.

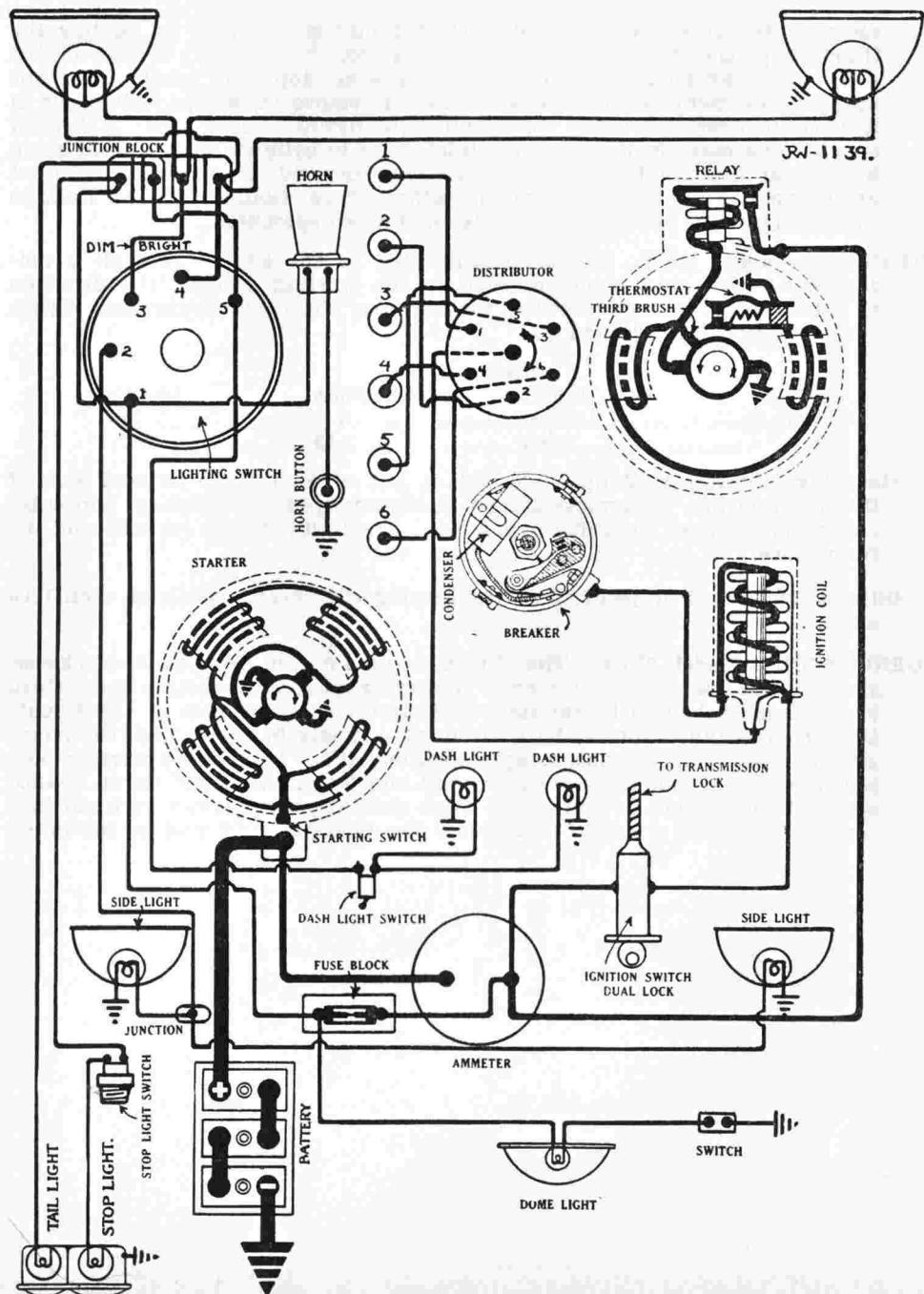
Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position $1\frac{1}{4}$ inches (on the flywheel) before top dead center with the manual spark control in the fully retarded position (pulled all the way out). To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard manual spark control by pulling spark button all the way out. Remove inspection hole cover in flywheel case and continue to turn engine over until a point on the flywheel $1\frac{1}{4}$ inches before the top dead center mark 'UDC #1' is directly in line with the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs as shown on the diagram.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Gaps are .030 inch.

VALVE TIMING:—**Specifications:**—Head diameter, 1 $13/16$ inches. Stem diameter, $11/32$ inch. Valve lift, $5/16$ inch. Spring pressure, 58 pounds (valve closed) and 90 pounds (valve open). Tappet clearance, .005 inch (inlet) and .007 inch (exhaust).

Timing:—Inlet valves open at top dead center and close 50 degrees after lower dead center. Exhaust valves open 48 degrees before lower dead center and close 2 degrees after top dead center. The flywheel is marked 'UDC #1. Int. Open' at point of inlet opening of cylinder No. 1.



R E O
MODELS 20 AND 25 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 724-M. Starter is connected to the engine through a mechanical pinion shift and an overrunning clutch. The direction of rotation of the armature shaft is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces each.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	3500	5	70
22 "	Lock	3	600

Mounting:—Starter is mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and remove 3 flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in each of the starter bearing oilers every month or each 1000 miles. Every six months or each 5000 miles, remove the grease plug in the gear case and repack the reduction gears with medium cup grease.

GENERATOR:—Model 955-G. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field combined with a thermostat. Thermostat contacts open at 160°F. cutting a resistance in the field circuit and reducing the output approximately 40%. To adjust the generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 18-19 amperes (cold) reached at 1450 R.P.M. or 25-26 M.P.H.

Generator Data					
Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000

Motoring freely, generator draws 5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension should be 14-18 ounces.

Mounting:—Generator is flange mounted at right of engine at rear of timing chain case. To remove generator, disconnect generator lead and remove flange mounting cap screws. Then slide generator to the rear. Generator drive is by slotted tongue from chain sprocket. Adjustment of timing chain is provided by loosening the generator mounting screws and moving the generator sideways. The chain should be loose enough to run noiselessly.

Oiling:—Put 8 or 10 drops of light engine oil in each of the generator bearing oilers every month or each 1000 miles.

RELAY:—Model 265-B. Relay is mounted on top of the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 3 amperes. Relay contacts separate .015-.025 inch. Air gap between relay armature and coil core is .014-.021 inch, contacts closed.

LIGHTING:—Delco-Remy Switch Model 482-F. Switch is mounted at lower end of steering column. Headlights are 6-8 volt, 21-21 cp. (double filament-double contact base using second 21 cp. filament instead of dimming) Mazda No. 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

FUSES:—Lighting fuse on block mounted on the dash is 20 amperes.

STUDEBAKER

MOTOR DICTATOR SIX MODEL GL
PRODUCTION STARTED JANUARY 1, 1930
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WJ-1-11, 6 volt, 90 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Battery is mounted on the right frame member under the floor boards of the front compartment.

IGNITION:—Coil Model 528-E. Coil is mounted on the dash. Ignition current is .5-2.5 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

Distributor Model 639-J. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on crescent shaped stationary contact mounting plate and turning eccentric adjusting screw until gap is .020 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 17-21 ounces. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 30 degrees reached at 2400 R.P.M. of engine.

Mounting:—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect primary lead and manual advance rod remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

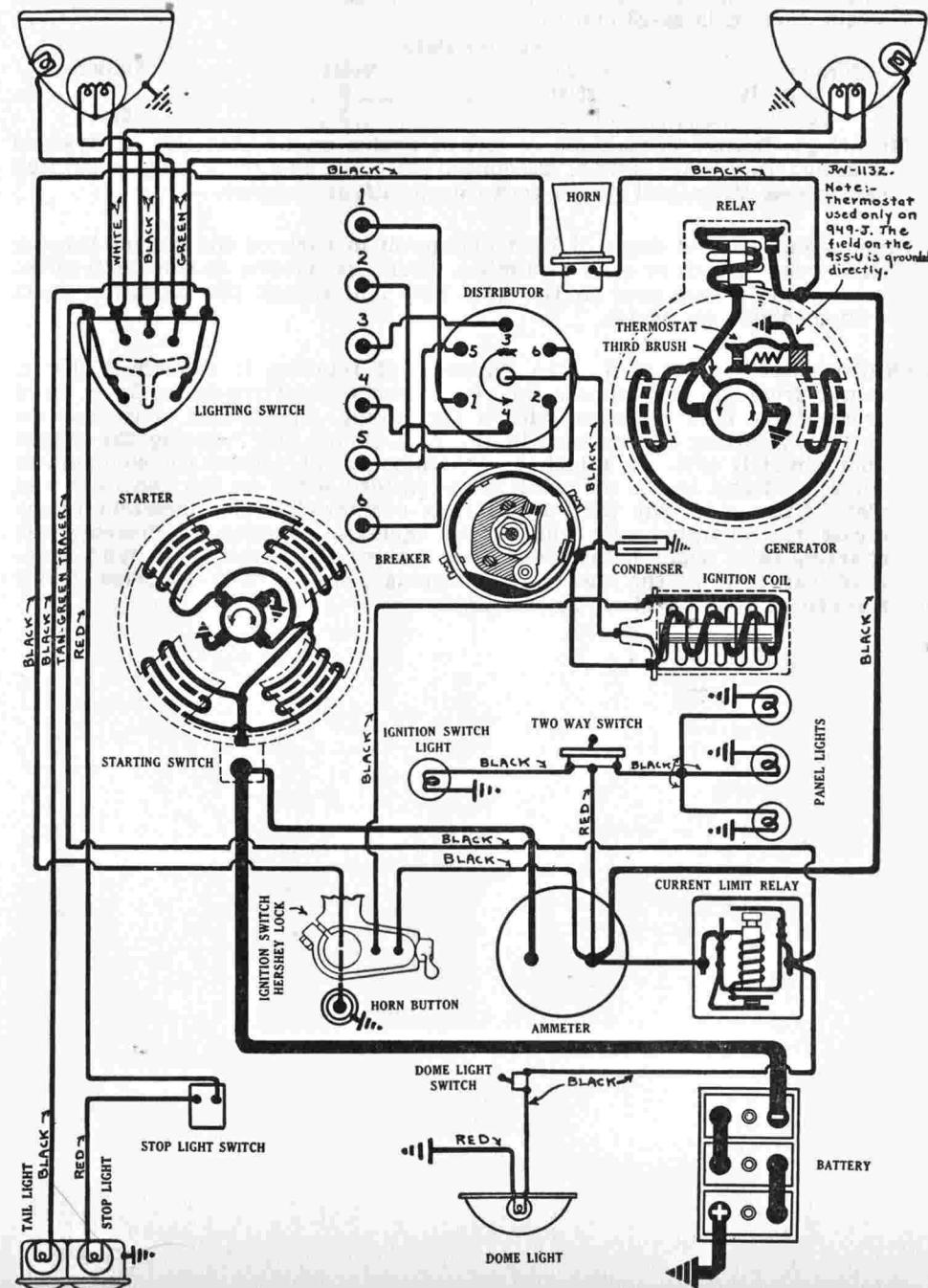
Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one turn every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and oil the felt oiler in the center of the shaft with light engine oil. Put a small bit of vaseline on the face of the breaker cam and a few drops of oil on the breaker arm pivot pin.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $7\frac{1}{2}$ degrees after top dead center with the spark control lever and breaker assembly in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Set the spark control lever in the half-way position between full retard and full advance. Continue to crank the engine over until the piston reaches top dead center when the flywheel mark 'UP-DC-1-6' will be directly opposite the indicator on the flywheel housing in the inspection hole at the right of the engine (this opening is covered by a cover plate on the upper right flywheel housing). Then loosen advance arm clamp screw and rotate distributor until breaker contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are $\frac{3}{8}$ -18 S.A.E. Standard. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, $\frac{5}{16}$ inch. Stem length, $5\frac{3}{8}$ inches. Valve lift, $5\frac{1}{16}$ inch. Spring pressure, 63-68 pounds. Tappet clearance, .004 inch (hot). Inlet valves open 5 degrees after top dead center and close 53 degrees after lower dead center.



STUDEBAKER

DICTATOR SIX MODEL GL
 PRODUCTION STARTED JANUARY 1, 1930
 DELCO-REMY GENERATING, STARTING SYSTEM
 DELCO-REMY IGNITION

EXHAUST VALVES:—Head diameter, 1½ inches. Stem diameter, 5/16 inch. Stem length, 5¾ inches. Valve lift, 5/16 inch. Spring pressure, 63-68 pounds. Tappet clearance, .006 inch (hot). Exhaust valves open 38 degrees before lower dead center and close 10 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 726-F. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter draws 275 amperes cranking the engine.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	.5	65
5.5 "	1050	.5	275
15 "	Lock	3.15	570

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable, starting pedal linkage and pedal return spring. Then take out three flange mounting cap screws. Pull starter forward to clear drive and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles of operation. The drive end bearing is oilless.

GENERATOR:—Model 955-U. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 10-12 amperes (hot) at 7.5 volts reached at 1650 R.P.M. or 19.3 miles per hour.

Generator Data

Cold Test			Hot Test		
Ampers	Volts	R.P.M.	Ampers	Volts	R.P.M.
15-17.....	8.0.....	1400.....	11-14.....	7.55-7.85.....	1700-1800.....

Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces. Generator motoring draws 5.5 amperes at 6 volts.

Model 949-J (used on all Export Models). This generator is similar to Model 955-U used on all domestic models except that the shunt field is grounded through a thermostat. Thermostat contacts open at 165°F. cutting the resistance connected across the thermostat contacts in series with the shunt field and reducing the output approximately 40%.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450.....	9-12.....	7.35-7.65.....	1800-2000.....

Mounting:—Generator is flange mounted at right of engine on rear of accessory bracket. To remove generator, disconnect lead and take out three flange mounting cap screws. Then pull generator to the rear to disengage drive coupling and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator oilers every six weeks or each 2500 miles of operation.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. or 7.7 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-E. Lighting switch is mounted at base of steering wheel column. Headlights are equipped with double filament bulbs and use a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights (in headlights) are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—Model 410-C. This device consists of a vibrating circuit breaker connected in the lighting circuit. It is mounted on the dash. The circuit breaker begins to vibrate when the current reaches 25-30 amperes and continues to operate limiting the current to 2-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

STUDEBAKER
DICTATOR EIGHT MODEL FC.
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WJ-1-11, 6 volt, 90 ampere hour. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 98 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 16 hours. Battery is mounted on left frame member under the floor boards of the front compartment. 4

IGNITION:—Coil Model 528-E. Ignition coil is mounted on dash. Ignition current is $\frac{1}{2}$ - $\frac{1}{2}$ amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped. The ignition switch is an Oakes 'Hershey' type co-incident steering post and ignition switch lock.

Distributor Model 658-Z. Breaker contacts separate .022 inch. Set breaker gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Distributor has two sets of contacts and a four sided breaker cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This interval is correct and contacts must be synchronized for proper performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2800 R.P.M. of engine. Breaker arm spring tension is 18-21 ounces.

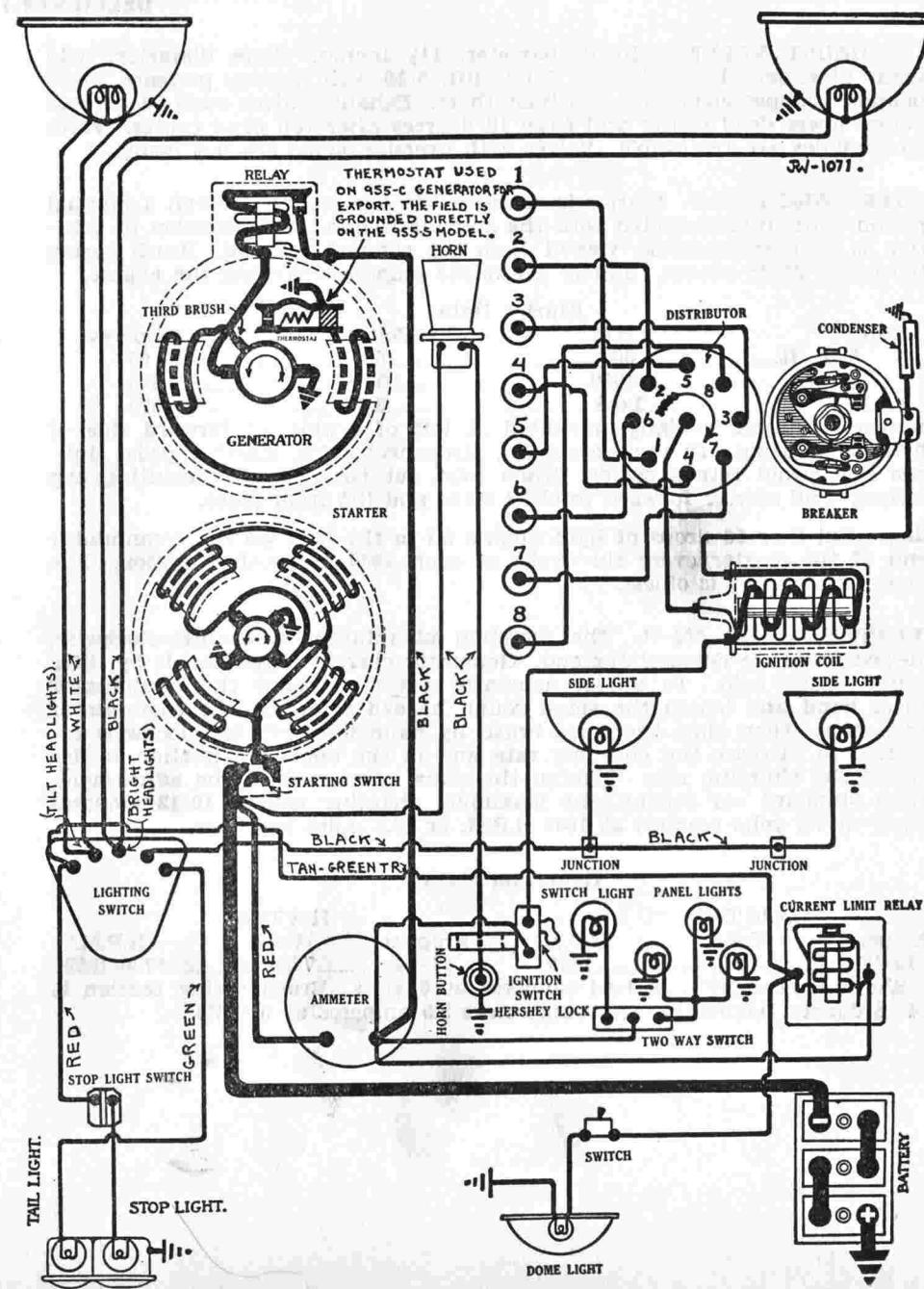
Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (top dead center with spark control lever advanced two thirds). If the second set of contacts do not begin to open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until contacts begin to open. Tighten the lock screws and check the breaker gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 17 degrees (on the flywheel) after top dead center with the manual spark control in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever. Continue to crank engine until piston reaches firing position. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until one set of contacts begins to separate. Tighten the clamp screw.

The engine can be timed at upper dead center with the flywheel mark 'UDC1-8' at the indicator if the spark lever is fully retarded and then advanced two thirds. This method is advised if contacts are synchronized without special tool. To synchronize contacts, crank engine over 90 degrees



STUDEBAKER
DICTATOR EIGHT MODEL FC.
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

when the flywheel mark 'UDC3-6' will be opposite the indicator with piston No. 6 on top dead center. The second set of contacts should be set to open at this point. Connect the spark plug cables in order 1-6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are S.A.E. Standard $\frac{7}{8}$ -18 Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{13}{32}$ inches. Stem diameter, $\frac{5}{16}$ inch. Stem length, 5 $\frac{7}{32}$ inches (over all). Valve lift, $\frac{9}{32}$ inch. Spring pressure, 63-68 pounds. Tappet clearance, .004 inch (hot). Inlet valves open at top dead center and close 40 degrees after lower dead center. The flywheel is marked 'UDC1-8' at point of inlet opening of cylinder No. 1.

EXHAUST VALVES:—Head diameter, 1 $\frac{9}{32}$ inches. Stem diameter, $\frac{5}{16}$ inch. Stem length, 5 $\frac{7}{32}$ inches (over all). Valve lift, $\frac{9}{32}$ inch. Spring pressure, 63-68 pounds. Tappet clearance, .006 inch (hot). Exhaust valves open 45 degrees before lower dead center and close 11 degrees after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model 726-G. Starter is connected to the engine through a manual pinion shift interconnected to the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.2	575

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod. Remove flange mounting cap screws and pull starter forward.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

GENERATOR:—Model 955-S, 955-C (Export). The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat on the Model 955-C. Model 955-S is not equipped with thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the field, and reducing the output approximately 40%. To adjust generator output,

remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the output. Tighten the screw. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 27 miles per hour.

Generator Data (955-S)

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
15-17	8.0	1400	11-14	7.55-7.85	1700-1800

Generator Data (955-C)

Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes		
19-21	8.35-8.5	1450	9-12	7.35-7.65	1800-2000

Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every six weeks or each 2500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 550 R.P.M. or 6-8 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-E. Switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—Model 410-C. This is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to operate with a current flow of 25-30 amperes limiting the current to 15 amperes. Contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

STUDEBAKER
COMMANDER SIX MODEL GJ
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-3. The positive (+) terminal is grounded. Starting capacity is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model 528-E. Ignition coil is mounted on the dash. Ignition current is $\frac{1}{2}$ - $\frac{1}{2}$ amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

Distributor Model 636-Y. Breaker contacts separate .018-.024 inch. Set contact gap by loosening lock screw on stationary contact mounting bracket and turning up contact stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 15 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 32 degrees at 3000 R.P.M. Breaker arm spring tension is 18-21 ounces.

Mounting:—Distributor is mounted on accessory bracket at right of engine. To remove distributor, disconnect primary lead and manual advance rod and remove distributor head with cables intact. Then loosen clamping plate screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and put 3 or 4 drops of light engine oil in the wick oiler in the center of the shaft.

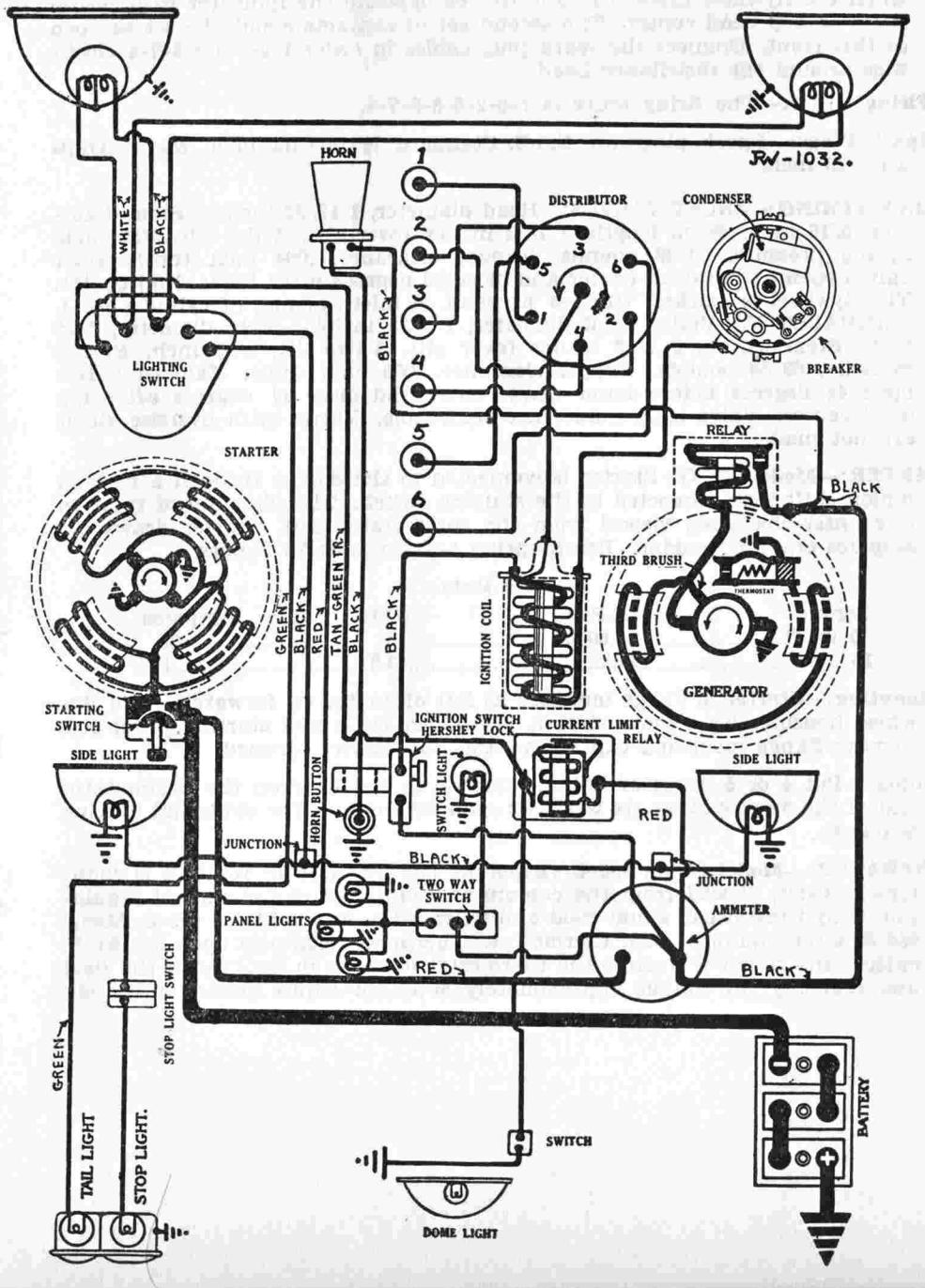
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position $7\frac{1}{2}$ degrees after top dead center with the spark control lever in the fully retarded position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully retard spark lever and then advance it exactly one half. Continue to crank engine until piston reaches top dead center when the flywheel mark 'UDC1-6' will be opposite the indicator on the flywheel case. Loosen the advance arm clamp bolt and rotate the distributor until the contacts begin to separate. Tighten the clamp bolt and connect the terminal opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 4-2-6-3-5 counter-clockwise around the distributor head.

Firing Order:—The firing order is 1-4-2-6-3-5.

Spark Plugs:—Spark plugs are S.A.E. Standard $\frac{7}{8}$ -18. Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—INLET VALVES:—Head diameter, $1\frac{5}{8}$ inches. Stem diameter, $5/16$ inch. Stem length, $5\frac{3}{8}$ inches (over all). Valve lift, $5/16$ inch. Tappet clearance, .003-.005 inch (cold). Spring pressure, 63 to 68 pounds. Inlet valves open 5 degrees after top dead center and close 53 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, $1\frac{1}{2}$ inches. Stem diameter, $5/16$ inch. Stem length, $5\frac{3}{8}$ inches (over all). Valve lift, $5/16$ inch. Tappet clearance, .005-.007 inch (cold). Spring pressure, 63 to 68 pounds. Exhaust valves open 38 degrees before lower dead center and close 10 degrees after top dead center. The flywheel is marked 'INT.OP1-6' at a point 5 degrees after the top dead center mark 'UDC1-6'. Valve stem guides are removable. Oversize valves are not made.



STUDEBAKER
COMMANDER SIX MODEL GJ
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

STARTER:—Model 726-F. Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	5000.....	5.....	65.....
15 "	Lock.....	3.2.....	575.....

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod. Then remove flange mounting cap screws and lift starter from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

GENERATOR:—Model 949-J. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 170°F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the generator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 24.2 miles per hour.

Generator Data

Ampères	Hot Test	
	Volts	R.P.M.
0.....	.6.4.....	710.....
7.....	.7.1.....	1120.....
10.....	.7.4.....	1500.....
12.....	.7.6.....	1650.....
10.....	.7.4.....	2800.....

Motoring, generator draws 6 amperes at 6 volts. Shunt field current is 5 amperes at 6 volts. Brush spring tension is 12-18 ounces.

Mounting:—Generator is flange mounted at right of engine on rear of accessory bracket. To remove generator, disconnect relay lead and remove flange mounting cap screws. Pull generator to rear and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every six weeks or each 2500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 600 R.P.M. of generator armature or 9.4 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Relay contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-E. Switch is mounted at lower end of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—Model 410-C. This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuit. It begins to vibrate when the current reaches 29-35 amperes and continues limiting the current to 15 amperes.

STUDEBAKER
COMMANDER EIGHT MODEL FD
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-3, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 104 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 18 hours. Battery is mounted on left frame member under front floor boards.

IGNITION:—Coil Model 528-E. Ignition coil is mounted on dash. Ignition current is $\frac{1}{2}$ - $2\frac{1}{2}$ amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

Distributor Model 658-V. Breaker contacts separate .022 inch. Set breaker gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Distributor has two sets of contacts and a four sided breaker cam. Contacts open alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This interval is correct and contacts must be synchronized for proper performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 20 degrees reached at 2800 R.P.M. Breaker arm spring tension is 17-21 ounces.

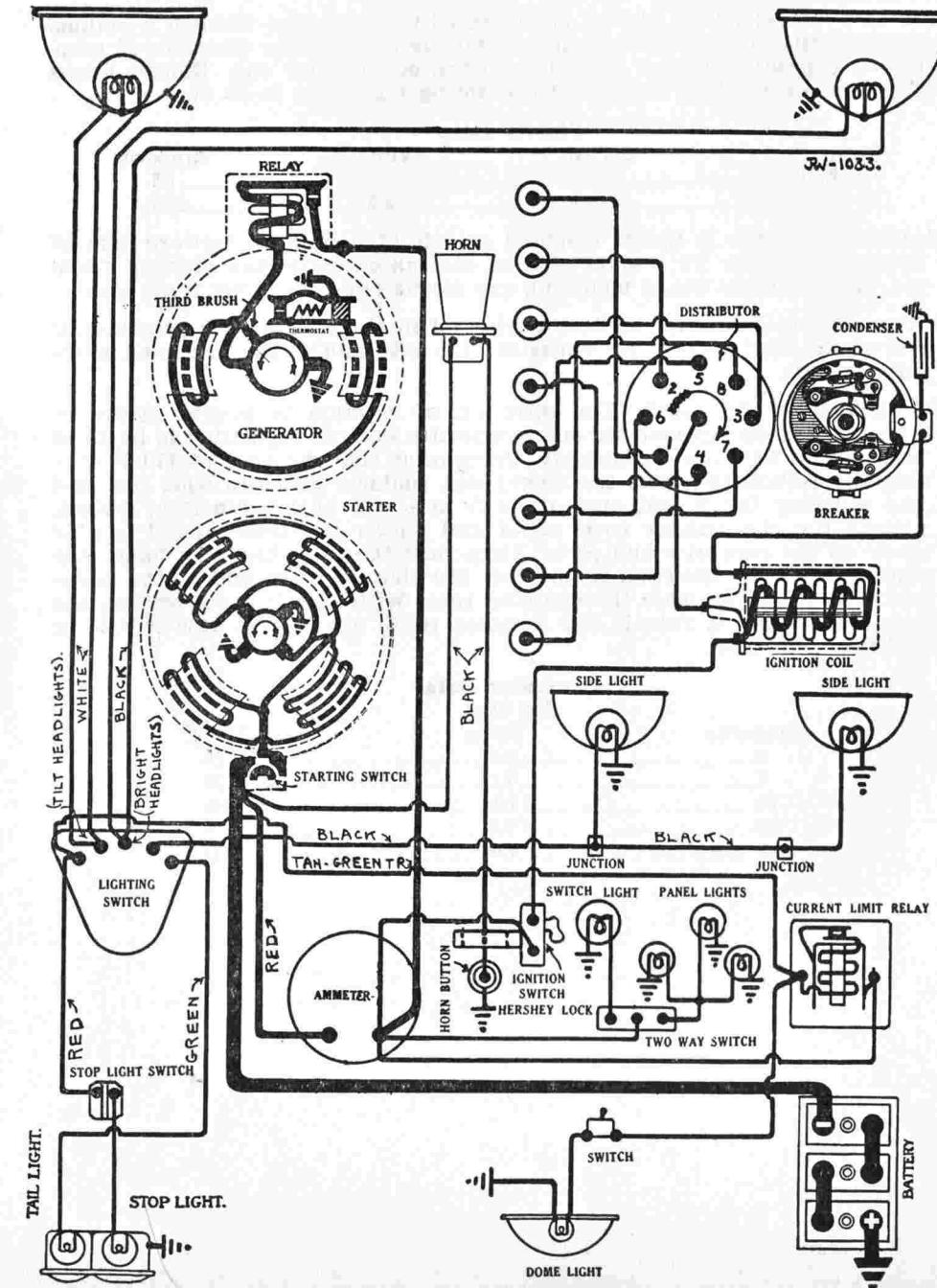
Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary lead and manual advance rod and remove head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick oiler in the center of the shaft with light engine oil.

Timing:—Synchronization of Contacts. Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to engine by cranking engine over exactly 90 degrees when piston No. 6 will reach firing position (top dead center with manual spark control advanced two thirds). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the breaker gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to open when the piston entering power stroke reaches a position 17° or $\frac{3}{4}$ inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston reaches a position $\frac{3}{4}$ inch before top dead center when the punch marks on the flywheel (which are $\frac{3}{4}$ inch before the top dead center mark 'UDC1-8') will be opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor in a counter-clockwise direction until one set of contacts begins to separate. Tighten the clamp screw.

The engine can be timed at upper dead center with the flywheel mark 'UDC1-8' at the indicator if the spark lever is fully advanced and then retarded one third. This method is advised if contacts are synchronized without special tool. To synchronize contacts crank engine over 90 degrees when the flywheel mark 'UDC3-6' will be opposite the indicator, with piston



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No. 6 on top dead center. The second set of contacts should be set to open at this point. Connect the spark plug cables in order 1-6-2-5-8-3-7-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are S.A.E. Standard $\frac{7}{8}$ -18. Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{13}{32}$ inches. Stem diameter, 5/16 inch. Stem length, 5 $\frac{7}{32}$ inches (over all). Valve lift, 5/16 inch. Tappet clearance, .004 inch (hot). Spring pressure, 63 to 68 pounds. Inlet valves open at top dead center and close 48 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 $\frac{9}{32}$ inches. Stem diameter, 5/16 inch. Stem length, 5 $\frac{7}{32}$ inches (over all). Valve lift, 5/16 inch. Tappet clearance, .006 inch (hot). Spring pressure, 63 to 68 pounds. Exhaust valves open 43 degrees before lower dead center and close 5 degrees after top dead center. Valve stem guides are removable. Oversize valves are not made.

STARTER:—**Model 726-G.** Starter is connected to the engine through a manual pinion shift interconnected with the starting switch. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter draws 275 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data			
Torque	R.P.M.	Volts	Amperes
0 lb. ft.	6000	5	65
15 "	Lock	3.15	.570

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod. Remove flange mounting cap screws and pull starter forward.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the starter every six weeks or each 2500 miles. The drive end bearing is oilless.

GENERATOR:—**Model 955-C.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160°F. cutting the resistance across the thermostat contacts in series with the field

and reducing the output approximately 40%. To adjust generator output, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the output. Tighten the screw. With standard car setting, the maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 22 miles per hour.

Generator Data					
Cold Test		Hot Test			
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450	9-12.....	7.35-7.65.....	1800-2000
Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.					

Mounting:—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the generator oilers every six weeks or each 2500 miles.

RELAY:—**Model 265-B.** Relay is mounted on the generator. Relay contacts close at 550 R.P.M. or 9.4 M.P.H. when the generator voltage reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—**Delco-Remy Switch Model 486-E.** Switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome light is 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—**Model 410-C.** This is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to operate with a current flow of 29-35 amperes limiting the current to 15 amperes. Contact gap is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

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PRESIDENT EIGHT

MODELS FE AND FH (1930) DELCO-REMY GENERATING, STARTING SYSTEM DELCO-REMY IGNITION

BATTERY:—Willard, Type SJWR-4, 6 volt. The positive (+) terminal is grounded. Starting capacity (20 minute rate) is 125 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 22 hours. Battery is mounted under front floor boards on right frame member.

IGNITION:—Coil Model 528-E. Coil is mounted on the dash. Ignition current is $\frac{1}{2}$ - $\frac{1}{2}$ amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped for each coil.

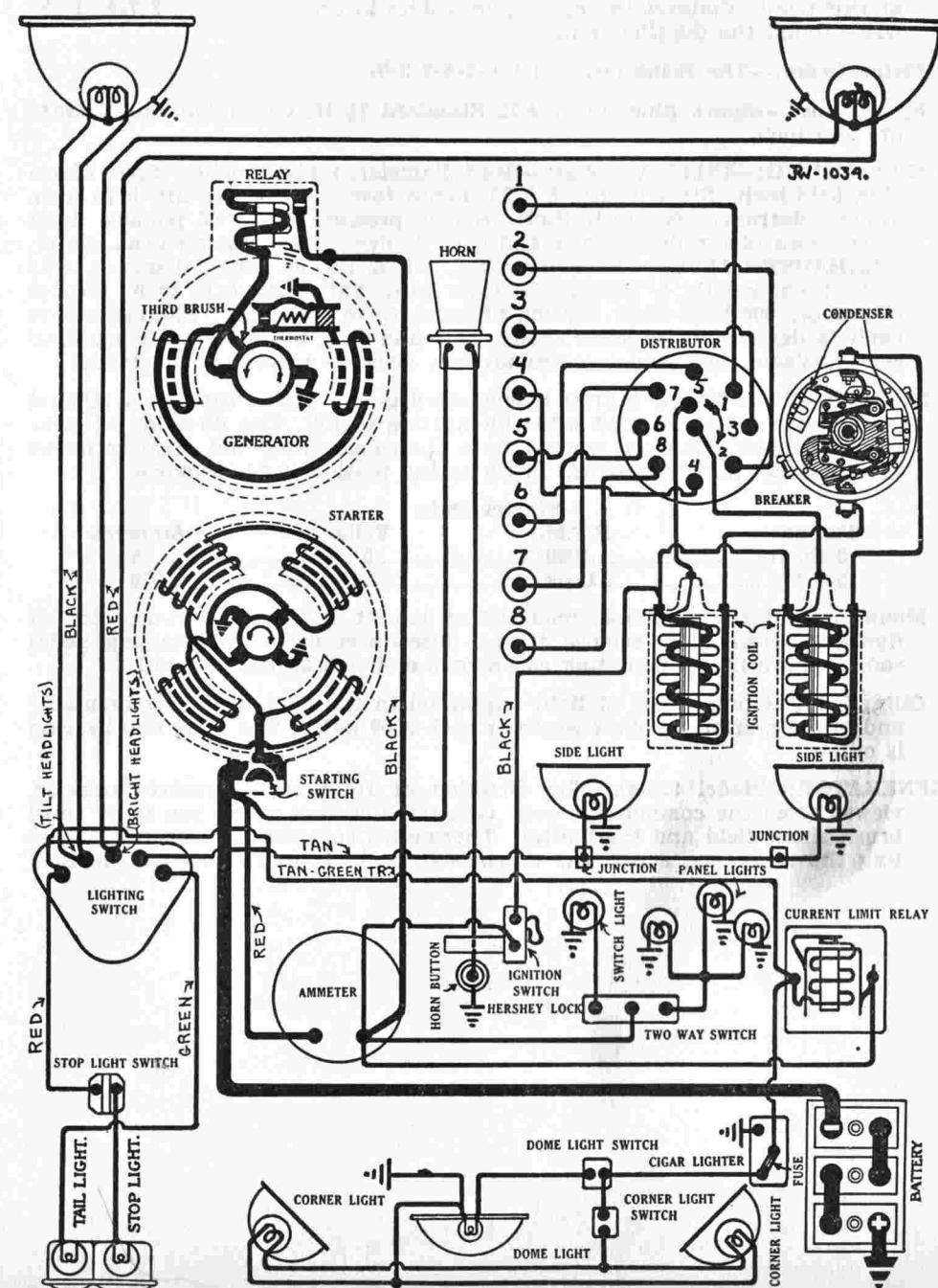
Distributor Model 668-C. Breaker contacts separate .018 to .022 inch. Set contact gap by loosening lock screw on stationary contact mounting plate and turning eccentric adjusting screw until proper gap is secured with breaker arm on lobe of cam. Breaker arm spring tension is 18-21 ounces. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker has two sets of contacts operating on a four sided cam. Each set of contacts controls one ignition coil and fires the spark plugs in four cylinders. Contacts separate alternately at intervals of 45 degrees corresponding to 90 degrees of crankshaft rotation. This is the correct firing interval for the President engine. Contacts must be accurately synchronized for correct performance. See Timing. Distributor is semi-automatic. Maximum manual advance is 25 degrees (engine). Automatic advance begins at 600 R.P.M. (engine). Maximum automatic advance is 17 degrees reached at 3200 R.P.M. (engine).

Mounting:—Distributor is mounted on the cylinder head. To remove distributor, disconnect primary leads and manual advance rod and remove distributor head with cables intact. Then loosen advance arm clamp screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down two turns every six weeks or each 2500 miles. At the same time remove the distributor head and rotor and saturate the wick in the center of the shaft with light engine oil.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part No. 1835009, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking the engine over exactly 90 degrees when piston No. 6 will reach firing position (top dead center with manual spark control advanced two thirds). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine. Breaker contacts begin to separate when piston entering power stroke reaches a position $8^{\circ}20'$ or 1 inch (on flywheel) before top dead center with manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine until piston reaches a position 1 inch before top dead center when the punch marks on the flywheel (which are 1 inch before the top dead center mark 'UDC1-8') will be opposite the indicator on the flywheel case. Then loosen advance arm clamp screw and rotate distributor counter-clockwise until one set of contacts begin to open. Tighten the clamp screw and connect the terminal directly over the carbon brush of the rotor to the



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MODELS FE AND FH (1930)

DELCO-REMY GENERATING, STARTING SYSTEM
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spark plug in cylinder No. 1. Connect the remaining plugs in order 3-2-4-8-6-7-5 clockwise around the distributor head (see diagram).

The engine can be timed with No. 1 piston on top dead center and flywheel mark 'UDC 1-8' directly opposite indicator if the manual spark control is fully advanced and then retarded one third. This setting is recommended if contacts are synchronized as part of the timing process. After the first set of contacts are set to open with piston on top dead center the engine should be cranked over 90 degrees until the flywheel mark 'UDC 3-6' is opposite the indicator. The second set of contacts should open at this point.

Firing Order:—The firing order is 1-6-2-5-8-3-7-4.

Spark Plugs:—Spark plugs are Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 21/32 inches. Stem diameter, 3/8 inch. Stem length, 5 5/8 inches (over all). Valve lift, 11/32 inch. Tappet clearance, .003 inch (cold). Spring pressure, 98 to 108 pounds. Inlet valves open 5 degrees after top dead center and close 45 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 9/16 inches. Stem diameter, 3/8 inch. Stem length, 5 5/8 inches (over all). Valve lift, 11/32 inch. Tappet clearance, .007 inch (cold). Spring pressure, 98 to 108 pounds. Exhaust valves open 40 degrees before lower dead center and close 12 degrees after top dead center. The flywheel is marked 'IN.OP1-8' at a point 5 degrees after the top dead center mark for cylinders 1 and 8. Valve stem guides are removable. Oversize valves are not made.

STARTER:—Model 728-C. Starter is connected to the engine through reduction gears and a manual pinion shift interconnected with the starting switch. The direction of rotation is clockwise (armature shaft), viewed from the commutator end. Starter draws 175 amperes cranking engine. Brush spring tension is 24-28 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	2500.....	5.....	70.....
28 "	Lock.....	3.....	600.....

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal rod and remove flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the armature shaft every six weeks or each 2500 miles. Once each year remove the grease plug in the reduction gear case and repack the gear compartment with medium grease.

GENERATOR:—Model 955-C. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 160° F. cutting the resistance across the thermostat contacts in series with the field and reducing the output approximately 40%. To adjust the charging rate, remove the commutator cover band and loosen the small round headed screw on the commutator end plate. Then shift the third brush by hand in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw. With standard car setting maximum charging rate is 19.5 amperes (cold) reached at 1650 R.P.M. or 22 M.P.H.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
19-21.....	8.35-8.5.....	1450.....	9-12.....	7.35-7.65.....	1800-2000.....
Motoring, generator draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.					

Mounting:—Generator is cradle mounted at left of engine and is driven by the fan belt. The water pump is driven by an extension of the generator shaft. To remove generator, disconnect pump coupling and relay lead and loosen mounting strap. Then slip off drive belt and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in each of the generator oilers every six weeks or each 2500 miles.

RELAY:—Model 265-B. Relay is mounted on the generator. Relay contacts close at 650 R.P.M. or 10 M.P.H. when the voltage of the generator reaches 6.4 volts and open with a discharge current of 1-2.5 amperes. Contacts separate .015-.025 inch. Air gap is .014 inch with contacts closed.

LIGHTING:—Delco-Remy Switch Model 486-E. Lighting switch is mounted at base of steering column. Double filament headlights are used instead of dimming. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Dome and corner lights are each 6-8 volt, 6 cp. S.C. Mazda 81.

CURRENT LIMIT RELAY:—This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. The circuit breaker begins to vibrate when the current reaches 29-35 amperes and continues limiting the current flow to approximately 15 amperes. Contact opening is .012-.030 inch. Air gap is .015-.025 inch with contacts closed.

VIKING
MODEL V-30 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

BATTERY:—Willard, Type WSD-15, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 114 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 20 hours. Battery is mounted on the right frame member.

IGNITION:—Coil Model 528-P. Ignition coil is mounted on the dash with the ignition switch (which is built in the base of the coil) extending through to the face of the instrument panel. Ignition current is 1.5-3 amperes at 6 volts with engine running and 4-5 amperes at 6 volts with engine stopped.

Distributor Model 658-T. Breaker contacts separate .022 inch. Set contact gap by loosening lock screw on stationary contact mounting stud and turning eccentric adjusting screw until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 22 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 3400 R.P.M. of engine. Breaker has two sets of contacts on a four sided cam. Contacts open alternately at 45 degree intervals corresponding to the 90 degree firing interval of the engine crankshaft. Contacts must be synchronized for satisfactory ignition performance. See Timing.

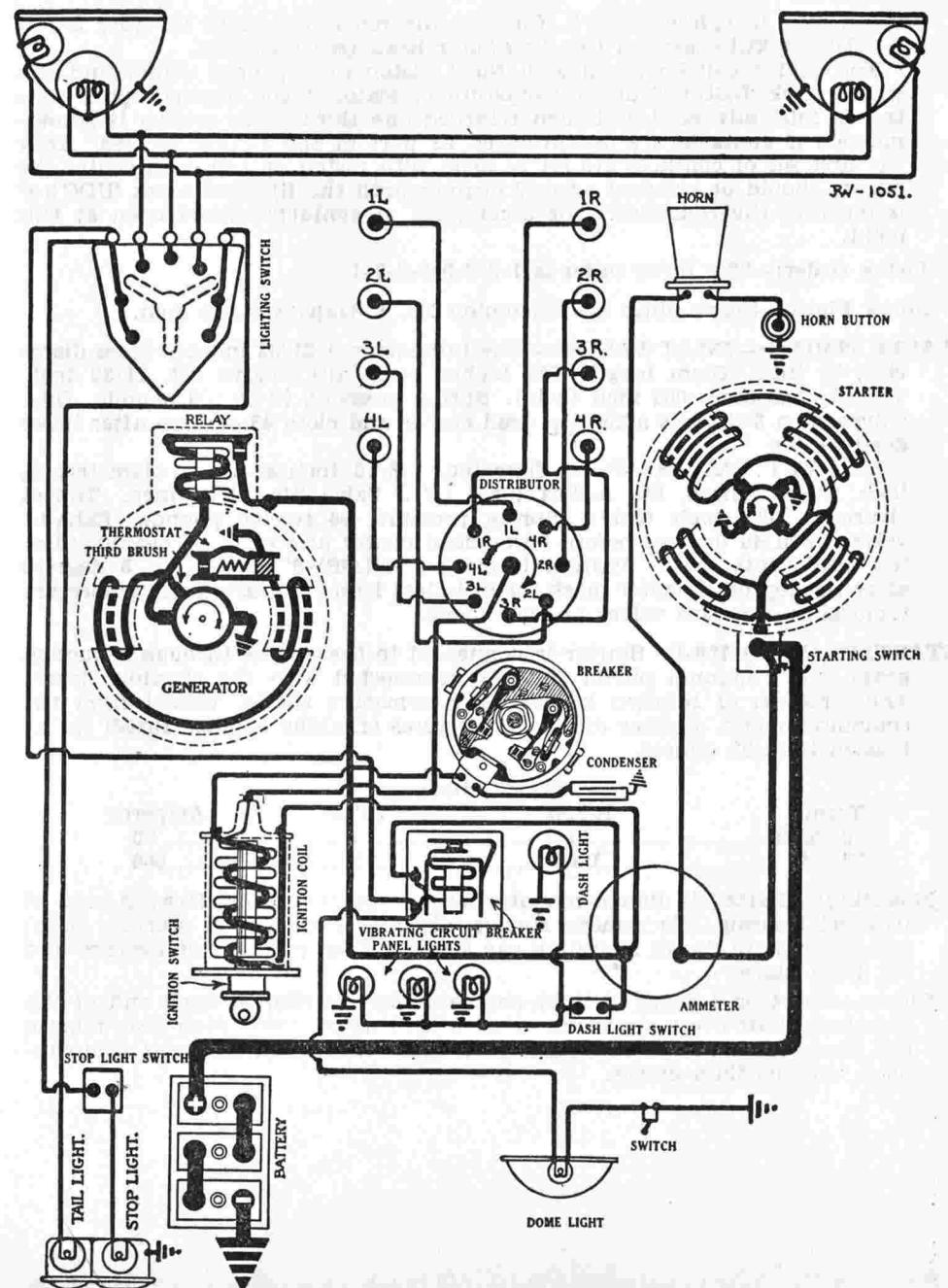
Mounting:—Distributor is mounted on the crankcase between the cylinder banks at the rear of the engine. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out manual advance stop screw and lift distributor from place.

Oiling:—Fill the grease cup on the side of the distributor shaft with medium cup grease and turn down one half turn every month or each 1000 miles of operation. Put one drop of oil on the breaker arm pivot pins and put a small bit of vaseline on the face of the breaker cam every 1000 miles.

Timing:—**Synchronization of Contacts.** Synchronize contacts on a rotary spark gap or use special Delco-Remy tool, Part 820738, and follow complete directions in Equipment Section. Contacts can be synchronized without special equipment after distributor has been timed to the engine by cranking engine over exactly 90 degrees when piston No. 1L will reach firing position (.055 inch before top dead center with manual spark control fully advanced). If the second set of contacts do not open at this point, loosen the two lock screws on the movable sub-plate and turn the eccentric adjusting screw until the contacts begin to open. Tighten the lock screws and check the contact gap with breaker arm on lobe of cam. If outside limits of .018-.024 inch, reset at .022 inch and repeat synchronization.

Timing Distributor to Engine:—Breaker contacts begin to separate when the piston entering power stroke reaches a position .045 inch before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1R enters compression stroke (the up stroke with both valves closed). Fully advance spark lever. Continue to crank engine over until piston reaches firing position. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and make certain that the segment opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1R-1L-4R-2R-2L-3R-3L-4L. Cylinder blocks are right and left from the driver's seat. No. 1 cylinder is nearest the radiator.



VIKING
MODEL V-30 (1930)
DELCO-REMY GENERATING, STARTING SYSTEM
DELCO-REMY IGNITION

Spark Plugs:—Spark plugs are 18MM. Metric. A.C. Type G-12. Gaps are .026 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 15/32 inches. Stem diameter, 11/32 inch. Stem length, 6 49/64 inches (over all). Valve lift, .340 inch. Spring pressure, 87 pounds with spring length of 1 29/32 inches (valve open). Tappet clearance, .008 inch (hot). Inlet valves open 1°20' before top dead center and close 51°20' after lower dead center.

EXHAUST VALVES:—Head diameter, 1 11/32 inches. Stem diameter, 3/8 inch. Stem length, 6 49/64 inches (over all). Valve lift, .340 inch. Spring pressure, 87 pounds with spring length of 1 29/32 inches (valve open). Tappet clearance, .010 inch (hot). Exhaust valves open 41°20' before lower dead center and close 11°20' after top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—**Model 725-H.** Starter is connected to the engine through a mechanical pinion shift interconnected with the starting switch. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 24-28 ounces. Starter cranks the engine at 145 R.P.M. drawing 175 amperes.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.....	6000.....	5.....	60.....
16 ".....	Lock.....	3.....	600.....

Mounting:—Starter is flange mounted at right of engine on forward side of flywheel housing. To remove starter, disconnect cable and starting pedal linkage and take out flange mounting cap screws. Then pull starter forward and lift from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at the commutator end of the starter every month or each 1000 miles of operation. The drive end bearing is oilless.

GENERATOR:—**Model 955-R.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field and thermostat. Thermostat contacts open at 165°F. cutting the resistance across the thermostat contacts in series with the shunt field and reducing the output approximately 40%. To adjust generator output, loosen the small round headed screw on the generator end plate and

remove the commutator cover band. Then shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. Tighten the screw after making the adjustment. With standard car setting, the maximum charging rate is 20 amperes at 8 volts reached at 1450 R.P.M.

Generator Data

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
7	7-7.1	825			
19-21.....	8.35-8.5.....	1450.....	9-12.....	7.35-7.65.....	1800-2000.....
8-14.....	7.5-8.1.....	3000.....			

Generator motoring draws 5.5 amperes at 6 volts. Shunt field current is 4-6.1 amperes at 6 volts. Brush spring tension is 14-18 ounces.

Mounting:—Generator is mounted at left of engine on special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and remove clamp bolt in adjustment arm. Then swing generator toward engine and slip off drive belt. Remove two bolts under generator and lift generator from place.

Oiling:—Put 8 or 10 drops of light engine oil in the oiler at each end of the generator every month or each 1000 miles.

RELAY:—**Model 265-G.** Relay is mounted on the generator. Relay closes when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Relay contact gap is .015-.025 inch. Air gap is .014-.020 inch with contacts closed.

LIGHTING:—**Switch Model 486-B.** Lighting switch is mounted at lower end of steering column. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights in headlights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop light is 6-8 volt, 15 cp. S.C. Mazda 87. Dash, dome and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

CURRENT LIMIT RELAY:—**Model 410-C.** This device is a vibrating circuit breaker mounted on the dash and connected in the lighting circuits. It begins to vibrate when the current reaches 25-30 amperes and continues limiting the current to 10-15 amperes. Circuit breaker contact gap is .012-.030 inch. Air gap is .019-.025 inch with contacts closed.

WHIPPET

MODEL 96-B (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-5X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 96 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17 hours. Battery is mounted on left frame member.

IGNITION:—Coil Model IG-4065. Coil is mounted on the right side of the engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4020-A. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 3400 R.P.M.

Mounting:—An Electrolock Ignition Switch is standard equipment. The Electrolock must be disconnected at the dash and removed with the distributor as a unit whenever the distributor is taken off the car. The Electrolock can then be disconnected from the distributor by taking off the nut on the terminal stud inside the distributor case and pulling the cable ferrule and stud out of the distributor. Distributor is mounted on the rear of the generator at the right of the engine. To remove distributor, disconnect Electrolock at dash, disconnect manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor every two weeks or each 500 miles. Every 5000 miles put one drop of oil on the breaker arm pivot pin and put a small bit of vaseline on the face of the breaker cam.

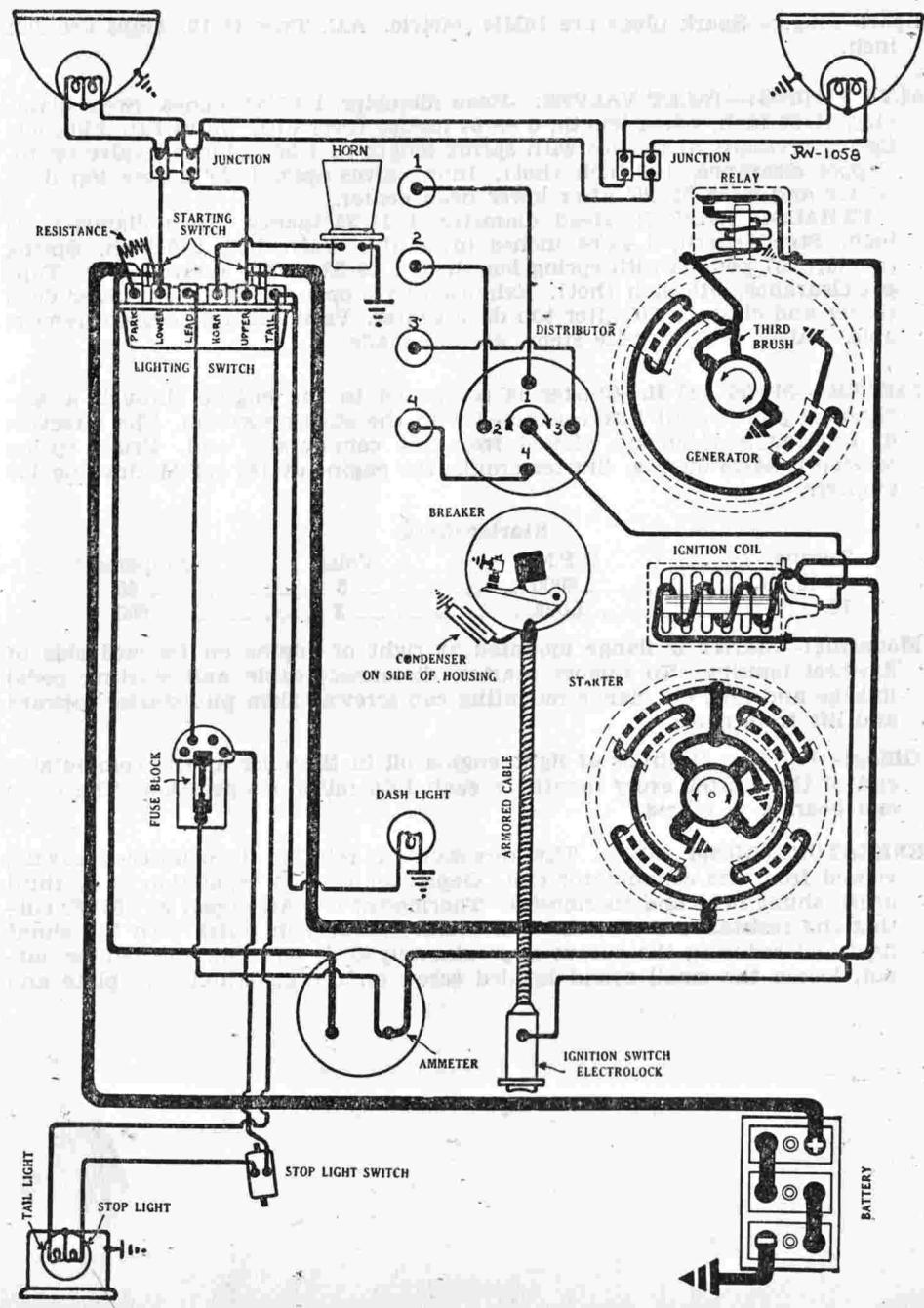
Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control and continue to crank engine until the top dead center mark on the flywheel is opposite the indicator mark in the flywheel case. Loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and connect the segment opposite the rotor to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 3-4-2 clockwise around the distributor head.

Firing Order:—The firing order is 1-3-4-2.

Spark Plugs:—Spark plugs are $\frac{1}{8}$ -18 S.A.E. Standard Champion No. 4. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 17/32 inches. Stem diameter, 11/32 inch. Stem length, 5 1/2 inches. Valve lift, 5/16 inch. Spring pressure, 48 pounds. Tappet clearance, .004 inch. Inlet valves open 7 degrees after top dead center and close 39 degrees after lower dead center.

EXHAUST VALVES:—Head diameter, 1 7/16 inches. Stem diameter, 11/32 inch. Stem length, 5 1/2 inches. Valve lift, 5/16 inch. Spring pressure, 48 pounds. Tappet clearance, .006 inch. Exhaust valves open 38 degrees before lower dead center and close 2 degrees before top dead center. Valve stem guides are removable. Valves with oversize stems are not made.



WHIPPET

MODEL 96-B (1930)

AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

STARTER:—Model MZ-4001. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 2½-3 pounds. Starter cranks the engine at 130 R.P.M.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free	.6	.50
1.5 "	1800	5.2	150
2.5 "	1325	5.0	200
5.0 "	740	4.5	300
7.6 "	220	4.0	400
12.2 "	Lock	.40	550

Mounting:—Starter is flange mounted at right of engine on forward side of rear motor support. To remove starter, disconnect cable and remove three flange mounting cap screws. Then pull starter forward to clear Bendix drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Model GAL-4116. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by tapping on the brush mounting stud with a screw driver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush is held in position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Motoring, generator draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts.

Mounting:—Generator is mounted at right of engine on rear of timing chain case. To remove generator, disconnect all ignition wiring or remove distributor. Then take off cover plate over chain case, remove nut on generator sprocket, pull sprocket. Then remove clamp band on generator, pull generator to the rear and lift from place. Tie up the timing chain and do not attempt to crank the engine with the generator out.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles.

RELAY:—Model CB-4014. Relay is mounted on generator. Relay closes at 675 R.P.M. when the voltage of the generator reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts separate .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Lighting switch is of 'Finger Tip Control' type and is mounted at the lower end of the steering column. The lighting switch, starting switch and horn button are combined in one unit controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. A parking resistance mounted on the switch dims the upper filament of the headlights for use as a parking light. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Dash and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail lamp lead must be connected to the 3 cp. filament.

NOTE:—Lighting switch is of Aid Manufacturing Company design and is their Model No. 314. It is manufactured by the Briggs and Stratton Company as their Model 50160.

FUSES:—Lighting fuse mounted on fuse block on the dash is 20 ampere capacity.

WILLYS SIX

MODEL 98-B (1930) SERIAL NUMBERS 130,001 UP

PRODUCTION STARTED NOVEMBER 7, 1929

AUTO-LITE GENERATING, STARTING SYSTEM

AUTO-LITE IGNITION

BATTERY:—U.S.L., Type 3-CVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 115 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 21 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4083. The ignition switch is built in the base of the coil. The ignition switch is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4032. Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Distributor is semi-automatic. Maximum manual advance is 10 degrees (distributor). This is controlled by a button on the dash. The engine is designed to run with the manual spark control fully advanced (the button pushed all the way in toward the dash). Pulling out the spark control button provides an auxiliary retard for starting. Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees reached at 3400 R.P.M. Breaker arm spring tension is 16-20 ounces.

Mounting:—Distributor is mounted at left of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and manual spark control and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

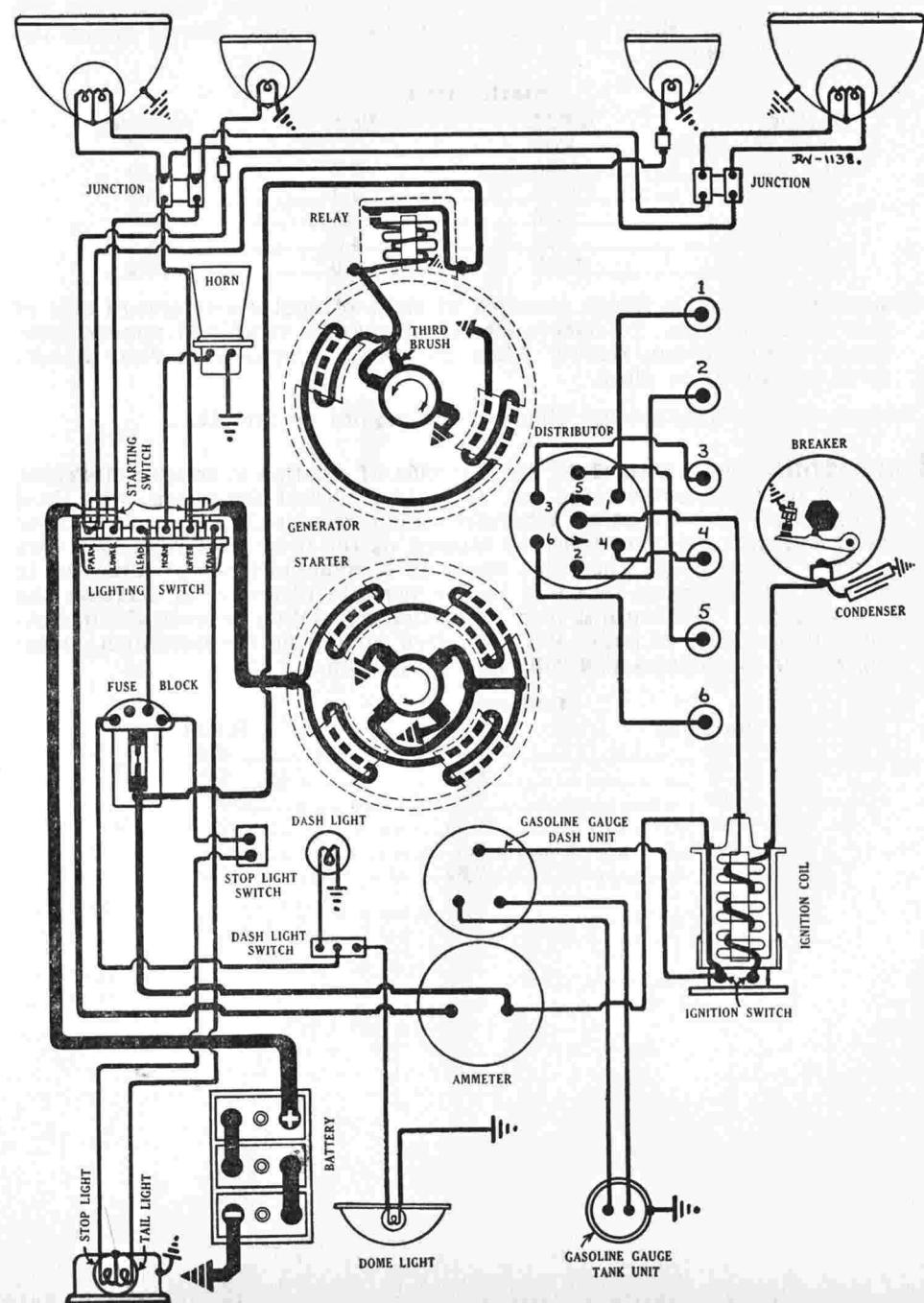
Oiling:—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor every week or each 250 miles of operation. Every 500 miles remove the distributor head and rotor and put 2 or 3 drops of oil in the oiler in the center of the shaft. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control (see that spark button is pushed all the way in toward the dash). Remove cover in flywheel inspection hole in left front face of flywheel housing. Turn engine over until piston reaches top dead center when the flywheel mark 'IGN' will be directly opposite the indicator in the inspection hole. Then loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are 18MM. Metric. Champion No. 11. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES:**—Head diameter, 1 $\frac{5}{8}$ inches. Stem diameter, .371 inch. Valve lift, 5/16 inch. Spring pressure, 81-86 pounds (compressed to 1 15/16 inches). Tappet clearance, .004 inch (hot). Inlet valves open 7



WILLYS SIX

**MODEL 98-B (1930) SERIAL NUMBERS 130,001 UP
PRODUCTION STARTED NOVEMBER 7, 1929
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION**

degrees before top dead center and close 39 degrees after lower dead center. The flywheel is marked 'I.O.' at point of inlet opening for cylinder No. 1.

EXHAUST VALVES:—Head diameter, 1 15/16 inches. Stem diameter, .372 inch. Valve lift, 5/16 inch. Spring pressure, 81-86 pounds (compressed to 1 15/16 inches). Tappet clearance, .006 inch (hot). Exhaust valves open 49 degrees before lower dead center and close 2 degrees before top dead center. Valve stem guides are removable. Valves with oversize stems are not made.

STARTER:—Model MAC-4225, superseded by Model MAJ-4002. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Starter cranks the engine at 140 R.P.M. Brush spring tension is 2½-3 pounds. The starting switch is mounted at the lower end of the steering column.

Starter Data—Model MAC-4225

Torque	R.P.M.	Volts	Amperes
.5 lb. ft.	2500.	5.5	100
2.7 "	1400.	5.0	200
5.0 "	900.	4.5	300
7.7 "	500.	4.0	400
10.6 "	160.	3.5	500

Starter Data—Model MAJ-4002

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	Free.	5.5	65
.3 "	2500.	5.5	100
2.3 "	1425.	5.0	200
4.6 "	975.	4.5	300
7.3 "	575.	4.0	400
10.3 "	225.	3.5	500

Mounting:—Starter is flange mounted at left of engine on forward side of flywheel housing. To remove starter, disconnect cable and take out two flange mounting bolts. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the starter every 500 miles of operation.

GENERATOR:—Model GAL-4131. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The brush mounting plate is held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 12 amperes (hot).

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2025
14	7.65	2925

Brush spring tension is 24-32 ounces. Shunt field current is 4.2 amperes at 6 volts. Generator motoring draws 4.7-5.7 amperes at 6 volts.

Mounting:—Generator is mounted at left of engine by special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then take out mounting bolt in swing mounting and lift generator from place.

Belt Adjustment. Fan belt tension is adjusted by shifting generator. To adjust belt, loosen adjustment clamp bolt and generator mounting bolt and swing generator to the left away from the engine until proper belt tension is secured. Tighten clamp bolt. The belt should be tight enough to drive generator and fan without slipping. Excessive belt tension will cause generator bearings to wear and is to be avoided.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every 250 miles of operation. Every 1000 miles refill the grease cup under the bearing retainer on the commutator end of the generator with pure vaseline.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at lower end of steering column. It is of the "Finger Tip Control" type, incorporating lighting switch, starting switch and horn button in a single unit controlled by a button on the steering wheel. Double filament headlights using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Tail and stop light use a double filament bulb and the tail light must be connected to the 3 cp. filament. Tail and stop light is 6-8 volt, 3-21 cp. D.C. Mazda 1158.

NOTE:—Lighting switch is of Aid Manufacturing Company design and is their part No. 314. It is manufactured by the Briggs and Stratton Company and is their Model No. 50160.

FUSES:—Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

WILLYS KNIGHT

MODEL 70-B (1930) AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTER:—U.S.L., Type 3-HVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted on left frame member under the front floor boards.

IGNITION:—Coil Model IG-4065. Coil is mounted on right side of engine block. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGC-4004. Breaker contacts separate .020-.025 inch. Set contact gap by loosening lock nut on stationary contact stud and turning up stud until proper gap is secured with breaker arm on lobe of cam. Resurface contacts with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 800 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 2350 R.P.M.

Mounting:—Distributor is mounted on the right of the engine. To remove distributor, disconnect manual advance rod and remove Electrolock from instrument board. Then remove distributor head with cables intact and remove two mounting cap screws in distributor base. Lift distributor from place and remove Electrolock and distributor as a unit.

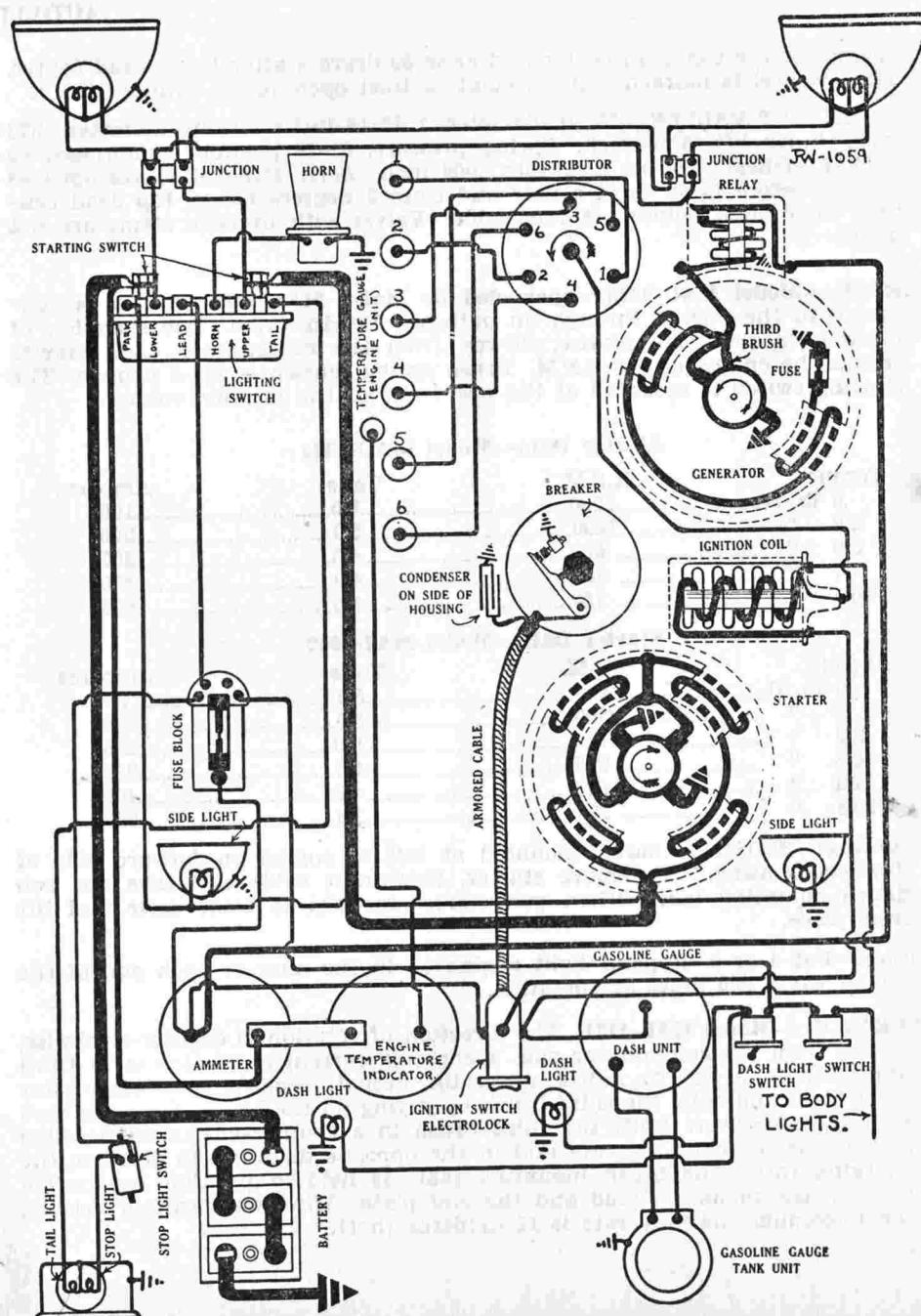
Oiling:—Fill the oiler on the side of the distributor housing with light engine oil every week or each 250 miles of operation. Every 500 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil. Put one drop of oil on the breaker arm pivot pin. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 8 degrees or $51/64$ inch (on the flywheel) before top dead center with the manual spark control in the fully advanced position. To set timing, crank engine over until piston No. 1 enters compression stroke. This may be determined by removing the spark plug in cylinder No. 1 and holding the hand over the spark plug port while the engine is being turned over until the air under compression is felt escaping. Place spark control button in the fully advanced position (pushed all the way in toward the dash) and continue to turn engine over until the ignition mark on the flywheel is directly opposite the indicator in the clutch inspection hole. This mark is 8 degrees or $51/64$ inch before top dead center and piston No. 1 will be .026 inch before top dead center. Then loosen advance arm clamp screw and rotate distributor until contacts begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1 (see diagram). The allowable variation in ignition setting is 1 degree or $1/8$ inch.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $7/8$ -18 S.A.E. Standard Champion No. 1. Gaps are .025 inch.

VALVE TIMING:—The Willys Knight engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 6 cylinder and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Then remove clutch inspection plate and crank engine until flywheel mark 'EC' is opposite the pointer on the flywheel case. Place electric lamp over spark plug port in cylinder No. 6 and rotate eccentric shaft in a clockwise direction until the



WILLYS KNIGHT

MODEL 70-B (1930)

AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

upper edge of the port in the outside sleeve passes the lower edge of the port in the cylinder block on the downward stroke. At this point the ray of light from the lamp will be cut off. Then assemble chain on crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in chain and change mesh of sprocket in chain one tooth at a time until the five cap screws can be inserted without changing the position of the eccentric shaft or crankshaft. Then tighten the five cap screws holding the sprocket rigidly on the shaft. To set tension of timing chain, turn idler eccentric bushing spring until all slackness is removed from chain. Then give spring one complete turn and insert end in slot of idler stud.

Valve Timing:—Inlet valves open 10 degrees or 1 inch on the flywheel after top dead center with the piston .041 inch down on intake stroke and close 35 degrees or $3\frac{1}{2}$ inches on the flywheel after lower dead center with the piston 4.066 inches from the top of the compression stroke. Exhaust valves open 50 degrees or 5 inches on the flywheel before lower dead center with the piston 3.725 inches down on power stroke and close 5 degrees or $\frac{1}{2}$ inch on the flywheel after top dead center with the piston .010 inch down on intake stroke.

STARTER:—**MAB-4014.** Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 140 R.P.M. drawing 250 amperes at 5 volts. Brush spring tension is $1\frac{3}{4}$ to $2\frac{1}{4}$ pounds.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900		100
3.5 "	1100		200
6.6 "	700		300
10.2 "	410		400
24 "	Lock	4	725

Mounting:—Starter is barrel mounted at the right of the transmission case on the rear of the flywheel housing. To remove, disconnect cable and remove pilot mounting screw directly above starter sleeve. Then slide starter to rear and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—**Model GAL-4103.** The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by tapping on the third brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The mounting plate is held in any

position by friction between the mounting stud and the end plate. The maximum charging rate is 17 amperes at 8 volts reached at 2075 R.P.M. or 23 miles per hour.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 24-32 ounces. Generator motoring draws 4.7-5.7 amperes at 6 volts. Shunt field current is 4.2 amperes at 6 volts. A five ampere field fuse is mounted on the top of the generator.

Mounting:—Generator is cradle mounted on the right side of the engine. To remove generator, disconnect lead and loosen two nuts on mounting strap. Then disengage coupling and lift generator from place.

every week or each 250 miles of operation. Every 1000 miles fill the grease cup under the bearing retainer on the commutator end of the generator with pure vaseline.

RELAY:—**Model CB-4014.** Relay is mounted on the generator. Relay closes at 750 R.P.M. or 5.5-6 M.P.H. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contacts open .025-.035 inch. Air gap between relay armature and coil core is .010-.030 inch with contacts closed.

LIGHTING:—Lighting switch is of 'Finger Tip Control' type mounted at the lower end of the steering column and is controlled by a button on the steering wheel. The lighting switch, starting switch and horn button are combined in a single unit. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Side lights are 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail lights are 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail lamp lead must be connected to the 3 cp. filament. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63.

NOTE:—Lighting switch is of Aid Manufacturing Company design and is their Model No. 314. It is manufactured by the Briggs and Stratton Company as their Model 50160.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuse mounted on fuse block on dash is 20 ampere capacity.

WILLYS KNIGHT
GREAT SIX MODEL 66-B (1929-30)
NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

BATTERY:—U.S.L., Type 3-HVX-8X-4A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 33.2 hours. Battery is mounted on the right frame member.

IGNITION:—Coil Type 22636. Coil is mounted at the right of the engine. Ignition current is 2 amperes at 6 volts with engine running and 4 amperes at 6 volts with engine stopped. The ignition switch is a Type 5-B Electrolock. Electrolock must be removed with the distributor as a unit. A full description of the Electrolock and instructions on removing it from distributor will be found in the Equipment Section.

Distributor Type 10877. Breaker contacts separate .020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 21 degrees reached at 3400 R.P.M. of engine.

Mounting:—Distributor is mounted at right of engine on top of oil pump housing. To remove distributor, disconnect Electrolock from dash, disconnect manual spark control and remove distributor head with cables intact. Then take out set screw in side of shaft housing and lift distributor from place.

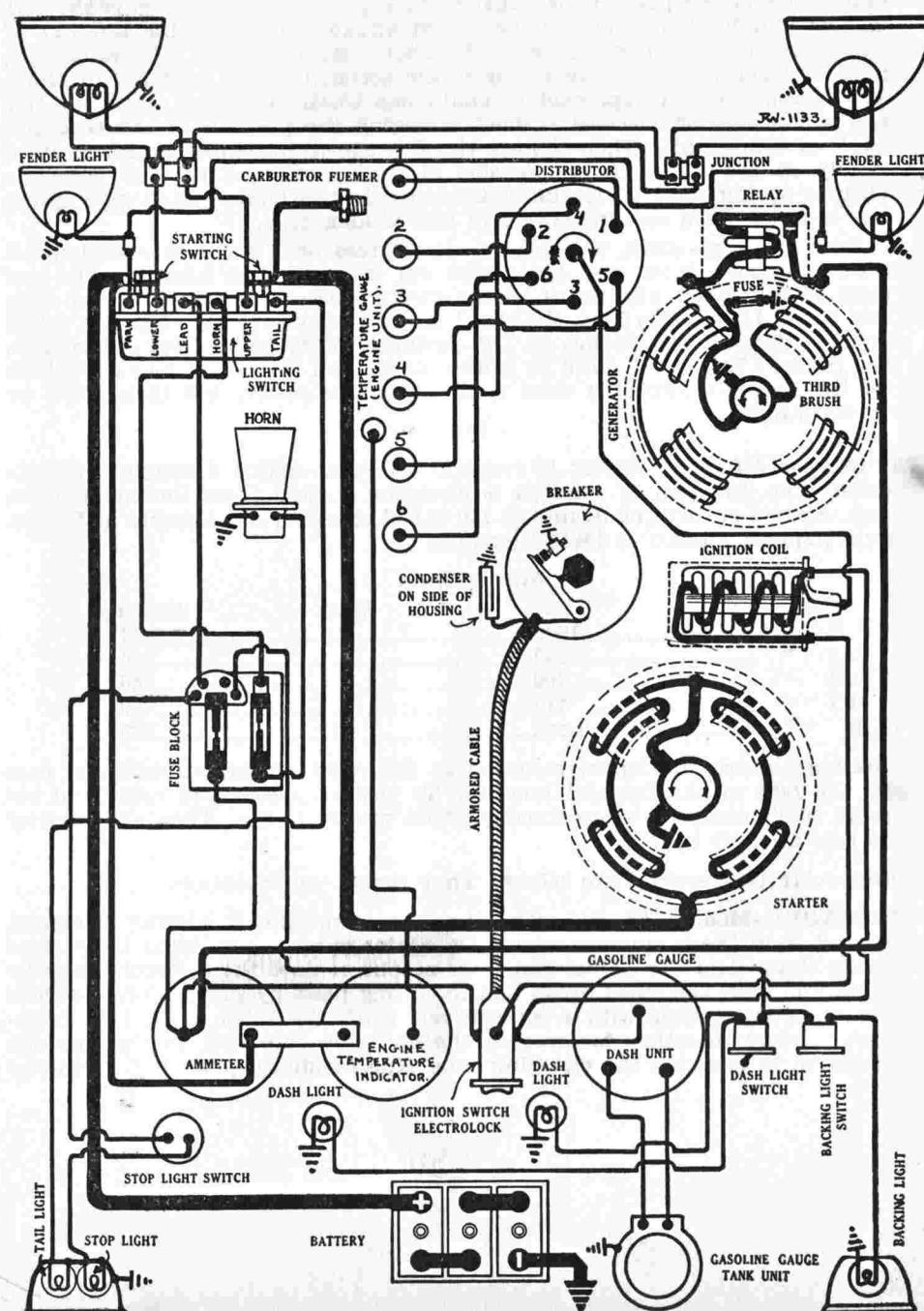
Oiling:—Fill the grease cup on the side of the shaft with medium cup grease and turn down one half turn every week or each 250 miles of operation. Every 1000 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft with light engine oil. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 16 degrees or $1 \frac{29}{32}$ inches on the flywheel before top dead center with manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This may be determined by removing spark plug in cylinder No. 1 and turning engine over until compression is felt. Fully advance spark control lever. Turn engine over until the mark 'IGN' on the flywheel, which is 16 degrees or approximately 5 teeth before the top dead center position, is directly opposite the indicator on the flywheel housing. Then loosen advance arm clamp bolt and rotate distributor until the contacts begin to open. Tighten the clamp bolt and see that the segment in the distributor head directly opposite the rotor is connected to the spark plug in cylinder No. 1. Connect the remaining spark plugs in order 5-3-6-2-4 clockwise around the distributor head.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 2. Gaps are .025 inch.

VALVE TIMING:—The Willys Knight 66-B engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold opposite No. 1 valve ports and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Remove inspection hole cover in flywheel housing and turn engine over until No. 1 piston reaches top dead center with the exhaust closing mark on the fly-



WILLYS KNIGHT
GREAT SIX MODEL 66-B (1929-30)
NORTH EAST GENERATING, STARTING SYSTEM
NORTH EAST IGNITION

wheel directly opposite the indicator on the flywheel housing. Remove spark plug in cylinder No. 1 and place a test lamp in the spark plug recess so that the light will be visible through the sleeve ports. Rotate eccentric shaft in the direction of rotation until the upper edge of the port in the outside sleeve passes the lower edge of the port in the cylinder block when the ray of light from the lamp will be cut off. Then assemble eccentric shaft sprocket and timing chain, being careful not to disturb the relative positions of the crankshaft and the eccentric shaft.

Valve Timing:—Inlet valves open 5 degrees after top dead center and close 46 degrees after lower dead center. Exhaust valves open 50 degrees before lower dead center and close at top dead center.

STARTER:—Type 6585. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter brush spring tension is 3 pounds. The starting switch is mounted at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4800	6.1	35
2.2 "	1500	5.6	130
3.5 "	1200	5.25	170
5.5 "	900	5.0	230
8.25 "	600	4.5	310
11.5 "	300	4.0	410
16 "	Lock	3.3	540

Mounting:—Starter is sleeve mounted at right of engine on rear of flywheel housing. To remove starter, take up floor boards in front compartment. Disconnect cable and take out large pilot mounting screw in flywheel case directly above starter sleeve. Then pull starter to rear to clear drive and lift from place.

Oiling:—Starter bearings are oilless. They require no attention.

GENERATOR:—Type 6580. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, shift the third brush by turning the adjustment screw on the generator end plate. Turn the screw in a clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. With standard car setting the maximum charging rate is 16 amperes at 8 volts.

Generator Data		
Amperes (Cold)	R.P.M.	Amperes (Hot)
17.2	1000	12
18.6	1200	13.8
18.6	1400	13.8
17.9	1600	13.2
16.8	1800	12.6
15.7	2000	12.0
13.8	2400	10.7
12.0	2800	9.6

The above table holds with the generator voltage constant at 8 volts. Generator brush spring tension is 12-16 ounces. A ten ampere field fuse is mounted under a plug on the generator end plate (commutator end).

Mounting:—Generator is cradle mounted at right of engine and is driven through a flexible coupling from the chain case. To remove generator, disconnect lead and drive coupling. Loosen mounting clamp band and lift generator from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Type 20220. Relay is mounted on the generator. Relay contacts close when the generator voltage reaches 6.75 volts and open with a discharge current of 1-2 amperes when the generator voltage drops to 5.75-6.0 volts. Relay contact gap is .020-.025 inch. Air gap is .015 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at the lower end of the steering column. It is of the 'Finger Tip Control' type incorporating the lighting switch, starting switch and horn button in a single unit controlled by a button on the steering wheel. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87.

NOTE:—The lighting switch is of the Aid Manufacturing Company design and is their part No. 314. It is manufactured by the Briggs and Stratton Company as their Model 50160.

FUSES:—Generator field fuse is 10 ampere capacity. Lighting fuses mounted on fuse block on dash are 20 ampere capacity.

WILLYS KNIGHT

MODEL 66-B (1929-30)

AUTO-LITE GENERATING, STARTING SYSTEM AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-HVX-8X-4A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 170 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 33.2 hours. Battery is mounted on the frame member under the right front seat.

IGNITION:—Coil Model IG-4065. Coil is mounted on the right side of the engine. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped. The ignition switch is a Type 5-B Electrolock. The Electrolock must be removed with the distributor as a unit. A full description of the Electrolock and directions for removing it from the distributor will be found in the Equipment Section.

Distributor Model IGC-4029. Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until the correct gap is secured with the breaker arm on the lobe of the cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 16-ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 400 R.P.M. of engine. Maximum automatic advance is 20 degrees reached at 3400 R.P.M.

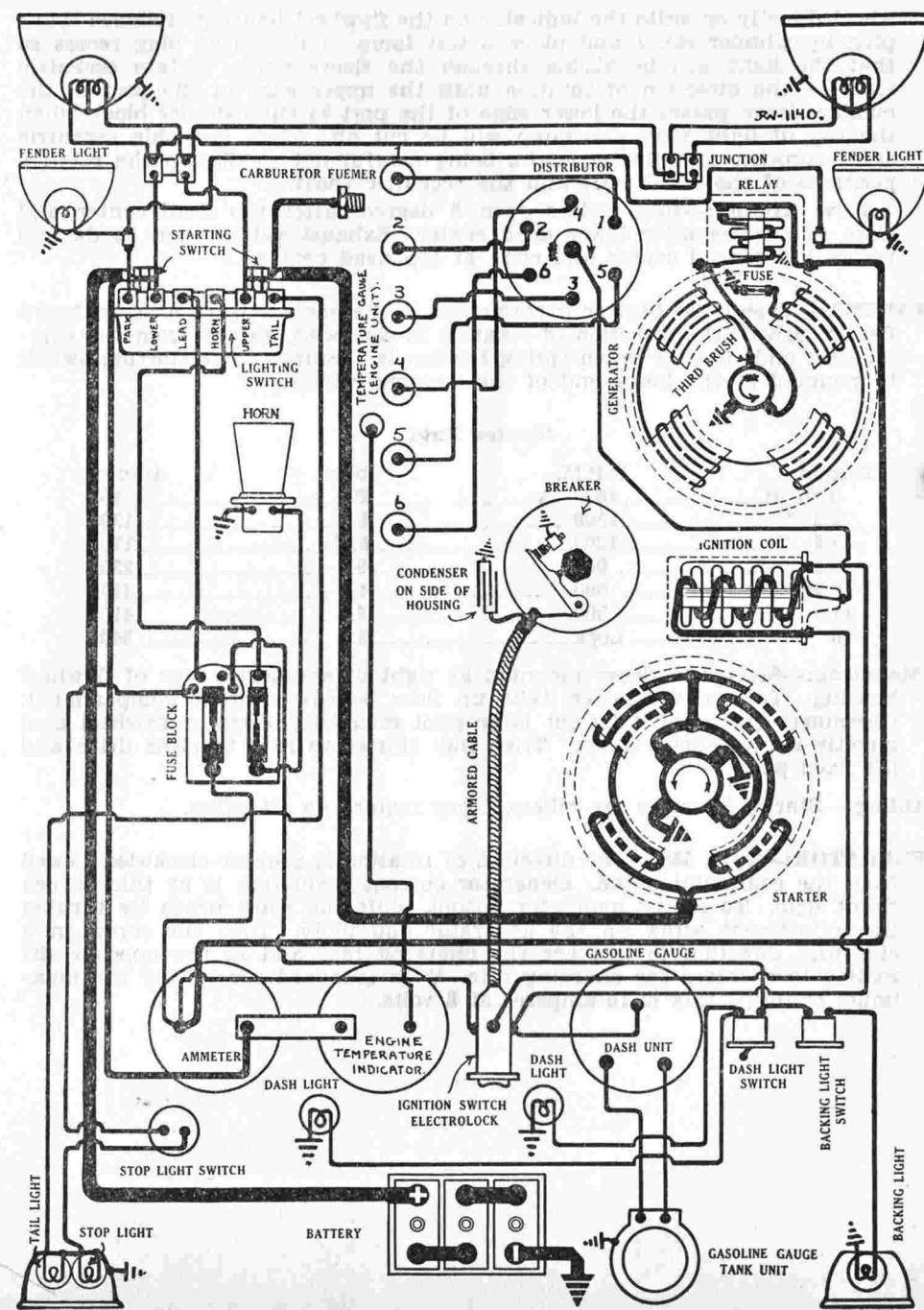
Mounting:—Distributor is mounted on top of oil pump housing at right of engine. To remove distributor, disconnect Electrolock at dash. Disconnect manual spark control and remove distributor head with cables intact. Then take out two cap screws in distributor mounting bracket and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor with light engine oil every week or each 250 miles of operation. Every 1000 miles remove the distributor head and rotor and put several drops of oil in the wick oiler in the center of the shaft and one drop of oil on the breaker arm pivot pin. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches a position 16 degrees or 1 29/32 inches on the flywheel before top dead center with the piston .112 inch before top dead center and the manual spark control in the fully advanced position (the spark control button pushed all the way in toward the dash). To set timing, crank engine over until piston No. 1 enters compression stroke. This may be determined by removing the spark plug in cylinder No. 1 and turning the engine over until the compressed air is felt escaping through the spark plug port. Fully advance the spark control button. Continue to turn engine over until the flywheel mark 'IGN' is directly opposite the indicator on the housing in the inspection hole in the flywheel housing. Take up all backlash in gears by turning distributor shaft in a counter-clockwise direction as far as possible. Then loosen advance arm clamp screw and rotate distributor until the contacts begin to open. Tighten the clamp screw and see that the distributor rotor is directly opposite the segment connected to the spark plug in cylinder No. 1.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Standard. Champion No. 2. Gaps are .025 inch.



WILLYS KNIGHT
MODEL 66-B (1929-30)
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION

VALVE TIMING:—The Willys Knight engine is of the sleeve valve type. To time sleeve valves with eccentric shaft sprocket removed, remove pipe plug in exhaust manifold directly opposite No. 1 exhaust port and scrape carbon from edges of sleeve ports so that closing of ports can be checked. Remove inspection hole cover in flywheel housing and turn engine over until No. 1 piston reaches top dead center with the flywheel mark 'EC' directly opposite the indicator on the housing. Remove spark plug in No. 1 cylinder and place a test lamp in the spark plug recess so that the light from the lamp will be visible through the valve port. Then turn the eccentric shaft in direction of rotation until the upper edge of the port in the outer sleeve just passes the lower edge of the port in the cylinder block when the light will be cut off. Assemble eccentric shaft sprocket and timing chain, being careful not to disturb relative position of eccentric shaft and crankshaft.

Valve Timing:—Inlet valves open 5 degrees or 19/32 inch on the flywheel after top dead center with the piston .011 inch down on intake stroke and close 46 degrees or 4½ inches on the flywheel after lower dead center with the piston 4.161 inches from the top of the compression stroke. Exhaust valves open 50 degrees or 5 31/32 inches on the flywheel before lower dead center with the piston 4.041 inches from the top of the power stroke and close at top dead center.

STARTER:—Model MAB-4018. Starter is connected to the engine through an outboard Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Brush spring tension is 28-36 ounces. The starting switch is mounted at the lower end of the steering column.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1900.		100
3.5 "	1100.		200
6.6 "	700.		300
10.2 "	410.		400
24 "	Lock.	4	725

Mounting:—Starter is sleeve mounted at right of engine on rear of flywheel housing. To remove starter, disconnect cable and take out large pilot mounting screw in flywheel case directly above starter sleeve. Then pull starter to the rear to clear drive and lift from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the starter every two weeks or each 500 miles of operation.

GENERATOR:—Model GAB-4009. The direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush and mounting plate by prying on the mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite di-

rection to decrease the charging rate. The brush is held in any position by friction between the mounting stud and the end plate. With standard car setting the maximum charging rate is 17.5 amperes at 8 volts reached at 1300 R.P.M.

Generator Data

Cold Test (72° F.)			Hot Test (206° F.)		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
4	6.8	630	4	6.8	750
10	7.4	780	10	7.6	1000
14	7.8	950	13	8.0	1400
17	8.0	1300	11	7.8	2000
13	7.8	1950			

The generator running as a motor at 355-390 R.P.M. draws 4.7-5.2 amperes at 6 volts. On test shunt field current is 6.1-6.8 amperes at 6 volts. Each coil tested separately draws 24.4-27.2 amperes at 6 volts. Brush spring tension is 16-24 ounces. A five ampere field fuse is mounted on the field frame under a removable cover.

Mounting:—Generator is cradle mounted at the right of the engine and is driven through a flexible coupling from the chain case. To remove generator, disconnect lead and drive coupling. Then loosen mounting clamp band and lift generator from place.

Oiling:—Put 5 or 6 drops of light engine oil in the oiler at each end of the generator every two weeks or each 500 miles of operation.

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay contacts close at 545-650 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of 0-2.5 amperes. Charging current must not exceed 5 amperes at closing of contacts. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Lighting switch is mounted at lower end of steering column. It is of the Finger Tip Control type, incorporating the lighting switch, starting switch and horn button in a single unit controlled by a button on the steering wheel. Double filament headlight bulbs using a second 21 cp. filament instead of dimmers are standard equipment. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and tail lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and backing lights are each 6-8 volt, 15 cp. S.C. Mazda 87.

NOTE:—The lighting switch is of the Aid Manufacturing Company design and is their part No. 314. It is manufactured by the Briggs and Stratton Company as their Model 50160.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuses mounted on fuse block on dash are 20 ampere capacity.